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First record of the fruit fly *Bactrocera* (*Bactrocera*) *nigrofemoralis* White & Tsuruta (Diptera: Tephritidae) in Bangladesh

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Abstract

The presence of fruit fly *Bactrocera* (*Bactrocera*) *nigrofemoralis* White & Tsuruta was recorded in Bangladesh for the first time. *B. nigrofemoralis* was captured in traps baited with sweet orange oil and cue-lure at the Atomic Energy Research Establishment campus, Ganak bari, Savar, Dhaka, Bangladesh in March 2015. The fruit fly species was distinguished from similar-looking *Bactrocera 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. The abundance of newly recorded fly was also estimated. In total, 153 *B. nigrofemoralis* were collected from different areas of the campus. The experimental results indicated the potential of essential oil and lures to detect unknown Tephritid fruit flies.

Keywords: *Bactrocera nigrofemoralis*, first record, essential oil, lures, fly abundance.

Introduction

The genus *Bactrocera* (Tephritidae) has more than 440 described species in the Old World tropics including severe pests of virtually all fruits and fleshy vegetables [1]. The males of most *Bactrocera* species were attracted to either of two kairomone male lures: Cue-lure [4-(p-acetoxypheyl)-2-butanone] and methyl-eugenol (4-allyl-1, 2-dimethoxy benzene-carboxylate) [2]. Of 54 pest species in the Asia-Pacific region, 26 respond to cue-lure and 16 are attracted to and ingest methyl-eugenol [3, 4].

Synthetic male lures are commonly used to monitor and mass trap pestiferous tephritid fruit flies. Male lures have found to variety of uses including surveys and detection related to quarantine [5, 6, 7], control on an area basis [8], eradication of isolated population [9] and the estimation of numbers in a natural population [10].

The aim of the present work was to detect the presence of new Dacine fruit flies in the Atomic Energy Research Establishment (AERE) campus, Ganak bari, 1349, Savar, Dhaka, Bangladesh using essential oil and different lures baited trap. The abundance of newly detect fruit fly was also estimated for 12 weeks at the AERE campus.

2. Materials and Methods**2.1. Fruit fly trapping with essential oil**

In the present experiment two traps baited with essential oil, Sweet Orange Oil from Australia was hung in trees about 1.5 meters above the ground at the garden near the Secondary Standard Dosimetry Laboratory (SSDL), located on the AERE campus, Savar (23° 59'N, 90° 16' E) in March, 2015. The area contains various local and exotic trees. Traps were made of plastic container (1/2 litre) with two round holes (10 mm) near the top of the container, to allow fly entry. Sweet orange oil (2ml) was soaked into small cotton ball and half of a 25x90 mm strip containing 10% dichlorvos (2,2-dichlorovinyl dimethyl phosphate) (Vapertape® II, Hercon Environmental, Emingsville, Pennsylvania, USA) were suspended from the trap's ceiling with a hook made of tie wire. The flies were collected after 7 days.

2.2. Fruit fly trapping with lures

Trap baited with three different lures (cue-lure, methyl-eugenol and trimedlure) were placed at six trapping locations in each of two experimental fields (AERE housing colony campus and AERE office campus), between March and May 2015. The AERE housing colony campus is comprised of kitchen gardens, different ornamental, fruit and medicinal plants as well as

commercial vegetables (cucumber, sweet gourd, bitter gourd, pumpkin, tomato etc.). The AERE office campus contains different local and exotic crop plantations (ornamental, fruits, medicinal), besides bushes and herbs. At each site one trap (described above) baited with each of the three lures was hung in trees about 1.5 meters above the ground. A plug with 2g of male lure (Scentry Biologicals, Billings, Montana, USDA-APHIS-PPQ) and half of a 25x90 mm strip containing 10% dichlorvos (2,2-dichlorovinyl dimethyl phosphate) (Vapertape® II, Hercon Environmental, Emingsville, Pennsylvania, USA) were suspended from the trap's ceiling with a hook made of tie wire. The flies were collected at weekly interval over 12 weeks.

2.3. Identification of new fruit fly, *Bactrocera* species

The fruit flies captured in traps were taken to the Insect Biotechnology Division, Institute of Food and Radiation Biology, AERE laboratory. *Bactrocera nigrofemoralis* White & Tsuruta (Diptera: Tephritidae) were at first separated by eye from other fruit flies based on their darker colour. Then each fly was photographed under a dissecting microscope, and different taxonomic features matched with those from published fruit fly records, especially with those from Bangladesh. To

confirm the identification, photographs and a few specimens of *B. nigrofemoralis* preserved in 100% ethanol in an Eppendorf tube were sent to Luc Leblanc (University of Hawaii at Manoa, Department of Plant and Environmental Protection Sciences, Honolulu HI, USA).

2.4. Statistical analysis

Data collected from capture of *B. nigrofemoralis* using lure baited traps from different locations of the AERE campus were analyzed using Analysis of Variance (ANOVA) using Statistical Software –Minitab, USA (version-15). Graph was created in Microsoft Excel 2007.

3. Results and Discussion

On average the male of the *B. nigrofemoralis* body was 5.5-6 mm long and the wing was 5.01 mm long (Fig. 1a-b). The fruit fly specimens were 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. All femora had predominantly dark black marking.

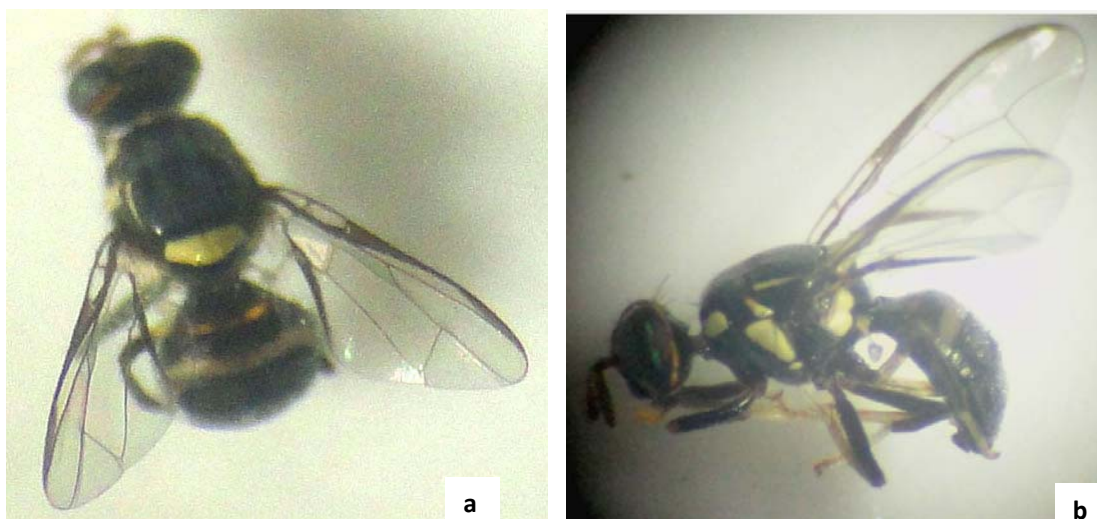


Fig 1 a-b: *Bactrocera nigrofemoralis* (male) in dorsal and lateral view.

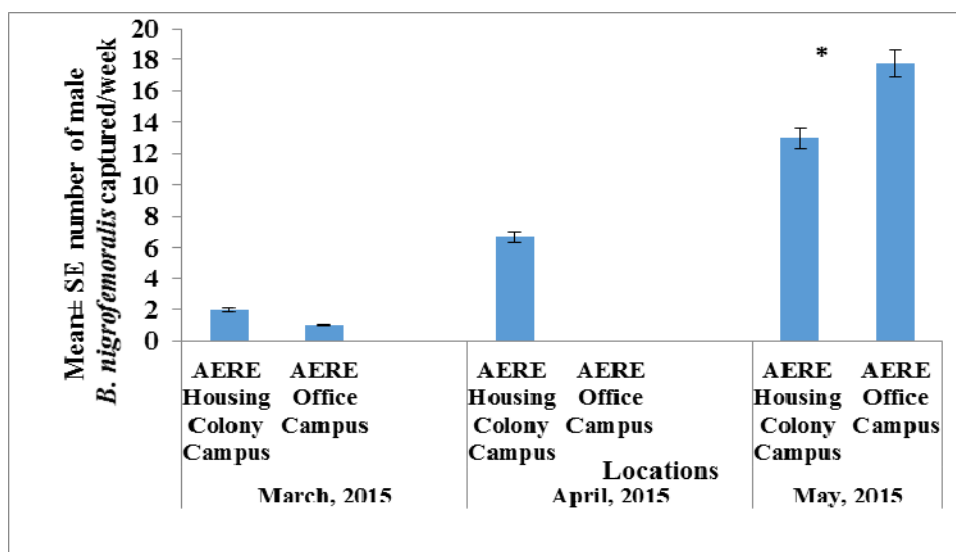


Fig 2: Mean ±SE number of male *B. nigrofemoralis* captured in traps baited with lures from two experimental fields during March-May, 2015. *denotes differences between means are statistically significant, p < 0.05.

In total, 153 *B. nigrofemoralis* were collected from different areas of the AERE housing colony campus and the AERE office campus during the experimental period (Fig. 2). The capture of *B. nigrofemoralis* was lowest in March, 2015. Mean capture of male *B. nigrofemoralis* was 17.75 ± 2.39 and 13 ± 3.67 per week at the AERE office campus and the AERE housing complex respectively, in May, 2015.

The fruit fly, *B. nigrofemoralis* was detected for the first time in Bangladesh. An adult male *B. nigrofemoralis* was initially collected on March 5, 2015 from the garden near the SSDL, AERE campus. Later a number of *B. nigrofemoralis* were collected using cue lures from different locations of the AERE campus. It is also distinct from other similar species in possessing a black face, the mesopleural stripe reaching to the anterior npl. seta and a broad basal black band on the scutellum^[11].

In the recent survey of^[11, 12] total twenty *Bactrocera* and *Dacus* fruit fly species were reported from different parts of Bangladesh among them at least 15 fruit fly species were detected from the AERE campus. The authors^[12] rectified the previously published erroneous record of *Bactrocera* (*Bactrocera*) *nigrofemoralis* (White & Tsuruta) as *Bactrocera nigrifacia* Zhang, Ji & Chen but mentioned that *B. nigrofemoralis* is likely present in Bangladesh, since it is known to occur in Sri Lanka, Southern India, Pakistan and Bhutan^[12, 13]. The present study confirms the presence of *B. nigrofemoralis* in Bangladesh.

The seasonal occurrence of melon fly, *Bactrocera cucurbitae* (Coq.) was studied at the AERE campus^[14] and noted that the population of *B. cucurbitae* largely depend on the availability of host plants. The known hosts of *B. nigrofemoralis* are fruits of acerola (Malpighiaceae: *Malpighia glabra* L.), Indian sandal wood (Santalaceae: *Santalum album* L.), mamey sapote (*Pouteria sapota* (Jacq.)), pomelo (Rutaceae: *Citrus maxima* Merr.), and tropical almond (Combretaceae: *Terminalia catappa* L.)^[13, 15, 16]. Therefore, this fruit fly species likely occurs in other parts of Bangladesh due to the widespread distribution of host plants, especially pomelo.

4. Conclusion

This is the first record of *B. nigrofemoralis* in Bangladesh. *B. nigrofemoralis* attracted to essential oil (sweet orange oil) as well as cue-lure and common at the AERE campus, Savar. Further research should focus on the biology, ecology, and economic impact of *B. nigrofemoralis* in Bangladesh.

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