Content list available at http://epubs.icar.org.in, www.kiran.nic.in; ISSN: 0970-6429

Indian Journal of Hill Farming

December 2022, Volume 35, Issue 2, Page 20-22

Fruit fly species new to India and Meghalaya

Sunita Chetry • Kennedy Ningthoujam*

College of Postgraduate Studies in Agricultural Sciences, (CAU- Imphal), Umiam-793103, Meghalaya

ARTICLE INFO

Article history:
Received: 03 September, 2022
Revision: 20 November, 2022
Accepted: 14 December, 2022

Key words: *Meghalaya, Dacini, Parapheromone, Zingerone, Bactrocera, Food baits*

DOI: 10.56678/iahf-2022.35.02.4

ABSTRACT

To find out the diversity of tephritidae species in Meghalaya, infested fruits and vegetables, parapheromonic traps (methyl eugenol and Zingerone), and food baits (Protein-x, soybean, and fruit baits: apple, pumpkin, banana) were used. Study was conducted at ICAR-NEH, NBPGR Research Farm, Umiam, Shillong (Meghalaya), Kyrdemkulai, Botanical Survey of India (BSI), Umiam, and the College of Post-Graduate Studies in Agricultural Sciences (CPGS-AS), Umiam, India from October 2020 to July 2021. Based on the morphological research, eleven Dacini tribe species recorded under three genera *Zeugodacus*, *Dacus* and *Bactrocera*. Out of these, two species were recorded for the for the first time in Meghalaya (*Dacus longicornis* and *Bactrocera abbreviata*), of which *B. abbreviata* is a new record for the country.

1. Introduction

India is steadily improving in the production of horticultural crops by utilizing its numerous resources. However, pests and diseases are the utmost barriers to the fastest growth of the horticultural sector. Many of the recognized pests, tephritid fruit flies are one of the foremost reasons for about 7000 crore annual financial loss (Sardana *et al*., 2005). Besides barriers in production, fruit flies also create restrictions in the export of fruit and vegetables. Strict quarantine and quality control measures are important to overcome export related restrictions in the global market (Sikhamany *et al*., 2005).

Due to different climatic conditions, hill agriculture is relatively more vulnerable to pests. They cause serious problems and lead to low productivity of almost all crops (Thakur *et al*., 2012). In addition, Northeast India, which has a huge natural forest ecosystem, borders five different countries, so migration of transboundary insects is also unavoidable. Wild fruit flies in forests are the source for maintaining the populations when fruit and vegetable crops are not in season.

Fruit flies are serious invasive pests that reduce domestic and commercial fruit production (Vargas *et al*., 2015). It includes the both fruit and flower eating maggots. New national and state records are reported from the present study that was carried out in agricultural and forest ecosystem of Meghalaya, India. New species, including those that have not yet been identified, will likely be found once extensive surveys are initiated in the diverse forest ecosystems.

2. Materials and Methods

2.1 Research area

The research was carried out at the NBPGR Research Farm of the ICAR-NEH, Umiam, Meghalaya, Kyrdemkulai, Botanical Survey of India (BSI), Umiam, and CPGS-AS, Umiam, India from October 2020 to July 2021. Fruit flies were collected using three methods: collecting infested fruits and vegetables setting up parapheromonic lure traps (methyl eugenol and Zingerone), and food bait (Protein-x, soybean, and fruit baits: apple, pumpkin, banana) traps.

2.2 Sampling method

Fruit flies infested fruits and vegetables (Pumkin, Guava and Tomato) having puncture mark made by the entry of the female's ovipositor were collected from the fields and brought to the laboratory in paper bags. Collected samples were kept in separate wire netting cages (20 cm × 20 cm × 26 cm) having a layer of sand at bottom for emerging larvae to pupate. After emergence of adult flies, they were fed with

*Corresponding author: kennedy1982@gmail.com

sugar solution for few days for their survival and development of colour patterns were used for identification.

2.3 Lure preparation

The experiment was carried out in the field with Methyl Eugenol (4-allyl-1, 2-dimethoxybenzene-carboxylate, CAS 93-15-12, Sisco Research Laboratories Pvt. Ltd. Purity level: 99%) and Zingerone [4-(4-hydroxy-3-methoxyphenyl)-2-butanone, CAS W312401, Sigma-Aldrich Purity level: ≥96%]. A one-liter empty water bottle was used to make low-cost bottle traps as mention in NIPHM training. Three one-inch windows were cut out with a knife from the top and with a needle, small holes were drilled in the centre of the cap. Cotton dental wicks and thick card board tied with thin wire to make a loop for hanging the lures bottle. Cotton dental wicks soaked in 5 ml of each lure treatment were individually placed in a plastic bottle trap.

2.4 Identification

Fruit fly fauna collected at weekly intervals were identified under a stereomicroscope (10x) using standard protocol based on established taxonomic keys and literature (David and Ramani, 2011). Cataloguing and documentation done using images and photographs. Fruit flies were identified with the help of Dr. David K Jacob, Scientist at ICAR-NBAIR, India.

3. Results

Eleven species under the tribe Dacini and genus *Bactrocera*, *Dacus*, and *Zeugodacus* were recorded. Two species were recorded for the first time in Meghalaya (*B. abbreviata and D. longicornis*), of which *B. abbreviata* is a new record for the country.

Description of the species

a) ***Bactrocera abbreviata*** (Hardy,1974): Mostly found in south Asian countries (China, Thailand, Philippines, Vietnam, Bangladesh, Nepal) with *Chionanthus ramiflorus* and *Olea salicifolia* (Oleaceae) as its host plants reported by Allwood *et al*., 1999; Drew and Romig, 2013; Leblanc *et al*., 2018; Doorenweerd *et al*., 2018 and Leblanc *et al*., 2019. In India (**NEW COUNTRY RECORD**) male species were recorded in zingerone traps.

Meghalaya report: Eight species were collected from ICAR-NEH, NBPGR Research Farm, Umiam, Shillong (Meghalaya). Note: According to Doorenweerd *et al*., 2018; this species may be a junior synonym for *B. bipustualata* (Bezzi, 1914), a species from Sri Lanka and India.

Characteristics: Costal band becomes thinner at R2+3 but never reach R4+5. Scutellum is yellow with a prominent medial longitudinal black stripe and two pairs of setae (Fig. 1); capture in zingerone trap.

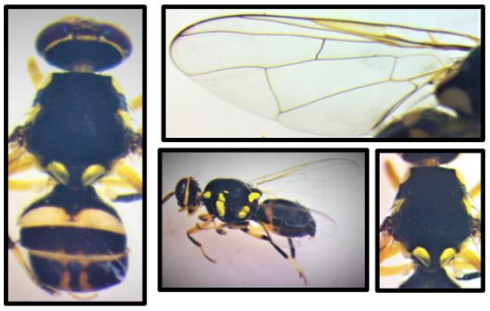

Fig 1: ***Bactrocera abbreviata***

b) ***Dacus longicornis*** (Wiedemann,1830): Mostly found in south Asian countries (Sri Lanka, Bhutan, Myanmar, China, Thailand, Laos, Vietnam, Malaysia, Brunei, Philippines, Indonesia, Nepal, Bangladesh, China, Thailand (Drew *et al*., 1998; Agarwal and Sueyoshi, 2005; Drew and Romig, 2013; Adhiraki *et al.,* 2018, Leblanc *et al*., 2019). It prefers fruits of *Luffa acutangula*, *L. cylindrica*, *Zehneri awallichii*, and *Trichosanthes cucumerina* (Cucurbitaceae) as its host plants reported by Allwood *et al*., 1999. Fruit bait (pumkin) traps at Kyrdemkulai captured four number of this (**NEW STATE RECORD**) species.

Characteristics: Comparatively larger fly with petiolate abdomen like that of a wasp, abdominal tergum I longer than broad, and connected to abdominal tergites (Fig. 2). Wing broad, dark, and fuscous costal band that overlaps vein R4+5 and gets darker at the apex.

Fig 2: ***Dacus longicornis***

4. Conclusions

North Eastern region is a natural hub of animals and plants. Since the region is a mix of national and international lines. Thus, finding new species of fruit fly enhance the biodiversity at India level and also important aspect of quartine regulation. All the collected sample belongs to three genus of fruit fly *viz*, *Bactrocera*, *Zeugodacus* and *Dacus. Bactrocera abbreviata* and *D*acus *longicornis* were recorded first time in Meghalaya, of which *B. abbreviata* recorded in zingerone trap is a new record for the country, making it extremely useful for quarantine and taxonomical study.

5. Acknowledgements

The authors wish to express their gratitude to the Dean, College of Postgraduate Studies in Agricultural Sciences, Umiam, Dr. David K. Jacob, Scientist at the ICAR-NBAIR, Bangalore, for identifying the specimens and the esteemed Committee members for their help during the period of the experiment. The financial assistance received from CAU is also acknowledged.

6. Refrences

Adhikari, D., Tiwari, D.B., and Joshi. S.L. (2018). Population dynamics of fruit flies in sweet orange (*Citrus sinensis* L.) orchards in Sindhuli, Nepal. *J. Agric. Environ.* 19: 9–16.Agarwal, M.L., and Sueyoshi, M. (2005). Catalogue of Indian fruit flies (Diptera: Tephritidae). *Orient. Insects*, 39(1): 371-433.

Allwood, A.J., Chinajariyawong, A., Kritsaneepaiboon, S., Drew, R.A.I., Hamacek, E.L., Hancock, D.L., Hengsawad, C., Jipanin, J.C., Jirasurat, M.C., Kong Krong, C., Leong, C.T.S., and Vijaysegaran, S. (1999). Host plant records for fruit flies (Diptera: Tephritidae) in Southeast Asia. *Raffles Bull. Zool.*, 47(7): 1-92.

David, K.J., and Ramani, S. (2011). An illustrated key to fruit flies (Diptera: Tephritidae) from Peninsular India and the Andaman and Nicobar Islands. *Zootaxa*, 3021: 1-31.

Doorenweerd, C., Leblanc, L., Norrbom, A.L., San Jose, M., and Rubinoff, D. (2018). A global checklist of the 932 fruit fly species in the tribe Dacini (Diptera, Tephritidae). *ZooKeys*, 730: 17-54.

Drew, R.A.I., and Romig, M.C., (2013). Tropical Fruit Flies (Tephritidae: Dacinae) of South-East Asia. *CAB International Wallingford,* pp. 653.

Drew, R.A.I., Hancock, D.L., and White, I.M. (1998). Revision of the tropical fruit flies (Diptera: Tephritidae: Dacinae) of South East Asia. II. *Dacus* Fabricius. *Invert. Taxon.* 12: 567-654.

Leblanc, L., Doorenweerd, C., San Jose, M., Pham, H.T., and Rubinoff, D. (2018). Descriptions of four new species of *Bactrocera* and new country records highlight the high biodiversity of fruit flies in Vietnam (Diptera, Tephritidae, Dacinae). *ZooKeys,* 797: 87-115.

Leblanc, L., Bhandari, B.P., Aryal, L.N., and Bista, S. (2019). New Country Records and Annotated Checklist of the Dacine Fruit Flies (Diptera: Tephritidae: Dacini) of Nepal. *Proceedings of the Hawaiian Entomological Society. 51(2):39-46.*

Sardana, H. R., Tyagi, A., and Singh, A. (2005). Knowledge resources on fruit flies (Diptera: Tephritidae) in India. National Centre for Integrated Pest Management, New Delhi, p.174.

Sikhamany, S. D., and Murti, G. S. R. (2005). Needed: Shift in Policies. In: Ram, N. (ed) The Hindu Survey of Indian Agriculture 1st edn. National Press, Chennai, pp.143-146.

Thakur, N. A., Firake, D. M., Behere, G. T., Firake, P. D., and Saikia, K. (2012). Biodiversity of agriculturally important insects in north eastern Himalaya: an overview. J. Hill Agric., 25(2): 37-40.

Vargas, R.I., Pinero, J.C., and Leblanc, L. (2015). An overview of pest species of *Bactrocera* fruit flies (Diptera: Tephritidae) and the integration of biopesticides with other biological approaches for their management with a focus on the Pacific region. *Insects*, 6(2): 297-318.