

Diversity and Abundance of Dacinae Fruit Flies (Insecta: Diptera: Tephritidae) in Pantai Melawi and Selising, Kelantan, Peninsular Malaysia.

Yong Hoi Sen*, Rosli Hashim, Mohd Sofian Azirun and Siti Zaleha Mat Diah

Institute of Biological Sciences, University of Malaya, 50603 Kuala Lumpur, Malaysia.

*yong@um.edu.my (corresponding author)

Received on 24th May 2009, accepted in revised form 7th October 2009.

ABSTRACT The diversity and abundance of Dacinae fruit flies of the family Tephritidae were studied at Pantai Melawi (Bachok) and Selising (Pasir Puteh), Kelantan. Male fruit flies were collected in the morning by using the attractants methyl eugenol and cue-lure. Three species (*Bactrocera carambolae*, *Bactrocera papayae* and *Bactrocera melastomatos*) were present in both localities, with *B. papayae* and *B. melastomatos* being more abundant in Pantai Melawi and *B. carambolae* more abundant in Selising. *Bactrocera caudata* occurred only in Pantai Melawi while *Bactrocera umbrosa* only in Selising. The two localities supported different species of Dacinae fruit flies and different density of the common species.

ABSTRAK Kepelbagaian dan kelimpahan lalat buah Dacinae (Famili Tephritidae) dikaji di Pantai Melawi (Bachok) dan Selising (Pasir Puteh), Kelantan. Lalat buah jantan ditangkap pada waktu pagi dengan menggunakan bahan penarik metil eugenol dan 'cue-lure'. Tiga spesies lalat buah (*Bactrocera carambolae*, *Bactrocera papayae* dan *Bactrocera melastomatos*) terdapat di kedua-dua lokasi, dengan *B. papayae* dan *B. melastomatos* didapati lebih banyak di Pantai Melawi dan *B. carambolae* di Selising. *Bactrocera caudata* hanya terdapat di Pantai Melawi manakala *Bactrocera umbrosa* hanya di Selising. Kedua-dua kawasan ini menampung spesies Dacinae yang berbeza dan kepadatan yang berbeza bagi spesies yang wujud di kedua-dua tempat.

(Keywords: *Bactrocera* species, methyl eugenol, cue-lure, fruit flies, Tephritidae, diversity, abundance)

INTRODUCTION

The tephritid fruit flies are plant feeders. Fruit flies of the subfamily Dacinae are represented by some 800 species worldwide, with some 300 species in Asia/south-east Asia [1, 2]. Many of them are of great economic and agricultural importance because of damage caused to commercial fruits and vegetables. The damage, if uncontrolled, may result in a total loss of the crop.

In Malaysia and other parts of the Orient, as well as the Pacific region, fruit flies of the genus *Bactrocera* - previously referred to the genus *Dacus* [1] – infest a great variety of fruit and vegetable crops. Among species with known host plants, some exhibit great specificity while others are polyphagous [3]. The degree of host specificity appears to be related to the extent of genetic diversity [4]. These fruit flies also show variability in their attraction to male chemical lures [4].

The present paper reports the diversity and abundance of Dacinae fruit flies, as determined by application of male chemical lures, in two localities with typical Malay village settings (Pantai Melawi

situated along sandy seashore and Selising located inland) in Kelantan.

MATERIALS AND METHODS

In the course of studying the fauna diversity (mammals, reptiles, amphibians, arachnids, insects and other invertebrates) at various localities in Kelantan, the diversity and abundance of tephritid fruit flies were studied at Pantai Melawi (Bachok) and Selising (Pasir Puteh). Pantai Melawi is situated along sandy seashore while Selising is some 20 km inland. Both have typical Malay village settings. Male fruit flies were collected in the morning on 13 May 2009 by means of the sex attractants methyl eugenol (4-allyl-1, 2-dimethoxybenzene) and cue-lure (4-[4-(acetyloxy) phenyl]-2-butanone) [both lures obtained from Sigma]. Small amount of these lures was applied separately and away from each other on the upper surface of a green leaf – one on mango and another on water apple for both lures (the lures are very effective and not affected by the leaf). Insects attracted to the lures over a period of about 30 minutes were collected with the aid of specimen tubes and plastic bags. The specimens were brought back to the laboratory for identification using current

literature [1, 2, 5] and preservation in ethanol. Representative individuals were also photographed in the field.

RESULTS AND DISCUSSIONS

The diversity and abundance of Dacinae fruit flies collected in Pantai Melawi and Selising are listed in Table 1. Three species of methyl eugenol group were present in Selising – *Bactrocera carambolae* Drew and Hancock, *Bactrocera papayae* Drew and Hancock and *Bactrocera umbrosa* (Fabricius). Only two species – *B. carambolae* and *B. papayae* (Figure 1) – were present in Pantai Melawi. The other species *B. umbrosa* (Figure 2) was not present in Pantai Melawi. The number of *B. umbrosa* in Selising was also small. This fruit fly infests *Artocarpus* fruits [6]. *Artocarpus* fruit tree was not evident in the vicinity of the study site at Pantai Melawi. The population of

B. umbrosa in Kelantan had been reported to be low in May; highest in February-March and lowest in August-November [7]. It is also uncommon in Terengganu but more common in the southern parts of Peninsular Malaysia [7].

Of the two species common to the two sites, *B. papayae* was much more abundant in Pantai Melawi, while *B. carambolae* was more common in Selising (Table 1). These two *Bactrocera* species exhibit host fruit preference, with *B. carambolae* being the predominant species infesting fruits of the families (among others) Combretaceae, Myrtaceae, Oxalidaceae, Sapindaceae and Sapotaceae; and *B. papayae* the predominant species of Anacardiaceae, Annonaceae, Apocyanaceae, Caricaceae, Flacourtiaceae, Guttifigerae, Musaceae, Palmae, Rutaceae and Solanaceae [8].

Table 1. Diversity and number of male Dacinae fruit flies attracted to methyl eugenol and cue-lure at two localities (Panati Melawi, Bachok; Selising, Pasir Puteh) in Kelantan, Peninsular Malaysia.

Lure/Species	Pantai Melawi	Selising
Methyl eugenol		
<i>Bactrocera carambolae</i>	1	5
<i>Bactrocera papayae</i>	23	1
<i>Bactrocera umbrosa</i>	0	3
Cue-lure		
<i>Bactrocera caudata</i>	11	0
<i>Bactrocera melastomatos</i>	4	1



Figure 1. A group of male Dacinae fruit flies attracted to methyl eugenol. At Pantai Melawi, Bachok, Kelantan only a single *Bactrocera arambolae* was evident (top left); the rest were *Bactrocera papayae*.



Figure 2. A male *Bactrocera umbrosa* attracted to methyl eugenol.

In Kelantan *B. carambolae*, like *B. umbrosa*, does not show clear patterns in their population modalities [7]. The population had been reported to be low in May; highest in December-January and June, lowest in October-November [7]. In contrast *B. papayae* populations tended to be unimodal, with the peak in August/September in Kelantan; much lower in March-May and lowest in December-January [7].

Of the cue-lure group two species (Figures 3, 4) - *Bactrocera caudata* (Fabricius) and *Bactrocera melastomatos* Drew and Hancock – were recorded. Both species were present in Pantai Melawi while only *B. melastomatos* was present in Selising. The host plants of *B. melastomatos* are *Melastoma* spp.; the wayside plant *Melastoma malabathrica* was present in both localities. In a previous extensive study in Kelantan, both *B. caudata* and *B. melastomatos* were not recorded [7]. Instead another species of the cue-lure group *Bactrocera cucurbitae* was recorded but not abundant. The main host plants of *B. caudata* and *B. cucurbitae* are Cucurbitaceae.

The two localities in the present study are situated in different districts – Pantai Melawi in Bachok and Selising in Pasir Puteh. It is evident that they supported different species of Dacinae fruit flies and different density of the common species (Table 1). It is anticipated that other species such as *Bactrocera albistrigata* (de Meijere), *Bactrocera latifrons* (Hendel), *Bactrocera arecae* (Hardy and Adachi) and *Bactrocera tau* (Walker) may be present. A more extensive study is needed to determine seasonal variation in diversity and abundance as well as utilization of the host plants.

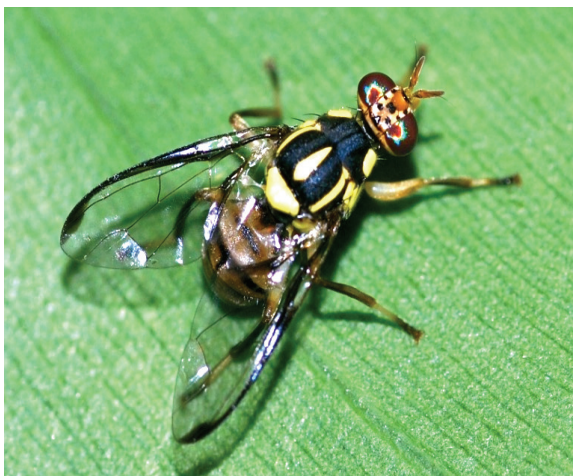


Figure 3. A male *Bactrocera caudata* attracted to cue-lure at Pantai Melawi, Bachok, Kelantan.



Figure 4. *Bactrocera caudata* (left) and *Bactrocera melastomatos* (extreme right) attracted to cue-lure at Pantai Melawi, Kelantan.

ACKNOWLEDGEMENTS

This study was supported by University of Malaya PJP Research Grant F295/2008A and Research Grant 67-02-03-0016.

REFERENCES

1. Drew, R. A. I. (1989). The taxonomy & distribution of tropical and subtropical Dacinae (Diptera: Tephritidae). In: *Fruit Flies, Their Biology, Natural Enemies and Control* Vol. 3A (eds. Robinson, A. S. & Hooper, G.) Elsevier, Amsterdam, pp. 9-14.
2. Yong, H. S. (1995). Genetic differentiation and relationships in five taxa of the *Bactrocera dorsalis* complex (Insecta: Diptera: Tephritidae). *Bulletin of Entomological Research* **85**: 431-435.
3. Yong, H. S. (1996). Host specificity and response to chemicals in Dacinae fruit flies (Insecta: Diptera: Tephritidae). In: *Biodiversity and the Dynamics of Ecosystems* (eds. Turner, I. M., Diong, C. H., Lim, S. S. L. & Ng, P. K. L.) DIWPA Series Volume **1**: 191-194.
4. Yong, H. S. (1992). Host specificity and genetic variability in Malaysian fruit flies (Insecta: Diptera: Tephritidae). *Proceedings of the National IRPA (Intensification of Research in Priority Areas) Seminar (Agriculture Sector), Volume 1: Crops and Plants*, Kuala Lumpur, Malaysia, pp. 233-234.
5. Drew, R.A.I. & Hancock, D.L. (1994). The *Bactrocera dorsalis* complex of fruit flies

- (Diptera:Tephritidae: Dacinae) in Asia. *Bulletin of Entomological Research Supplement 2*: 1-68.
6. Yong, H. S. (1988). Allozyme variation in the Artocarpus fruitfly *Dacus umbrosus* (Insecta: Tephritidae) from Peninsular Malaysia. *Comparative Biochemistry & Physiology 91B*: 85-89.
 7. Clarke, A. R., Allwood, A., Chinajariyawong, A., Drew, R. A. I., Hengsawad, C., Jirasurat, M., Krong, C. K., Kritsaneepaiboon, S. & Vijaysegaran, S. (2001). Seasonal abundance and host use patterns of seven *Bactrocera* Macquart species (Diptera: Tephritidae) in Thailand and Peninsular Malaysia. *The Raffles Bulletin of Zoology 49*(2): 207-220.
 8. Yong, H. S. (1994). Host fruit preferences in two sympatric taxa of the *Bactrocera dorsalis* complex (Insecta: Diptera: Tephritidae). In: *Current Research on Tropical Fruit Flies and Their Management* (eds. H. S. Yong and S. G. Khoo) The Working Group on Malaysian Fruit Flies, Kuala Lumpur, pp. 1-8.