

Full Length Research Paper

Thripidae (Thysanoptera) species collected from common plants and crops in Peninsular Malaysia

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A list of 32 species of thrips recorded from crops or plants in Peninsular Malaysia is presented. Most of the specimens came from a recent survey of cultivated plants, many of which were from the genus *Thrips*. The specimens were collected by beating vegetation (that is, either the flowers or leaves) over a plastic tray, subjected to a standard dehydration and clearing process before being slide mounted. Slide mounted specimens were then identified using taxonomic keys. This study also recorded two further species from Malaysia: *Frankliniella schultzei*, a polyphagous tospovirus vector and *Stenchaetothrips biformis*, the rice thrips. The study reveals thirty-two species recorded as associated with cultivated plants in Malaysia; of these, 17 were found on more than one species of plant.

Key words: Malaysia, thrips, crop, plant, diversity.

INTRODUCTION

Some species in the family of Thripidae, particularly those that are polyphagous, are crop pests due to their feeding damage such as *Frankliniella occidentalis* and *Thrips hawaiiensis*, whilst *Thrips palmi* can be vector of damaging tospoviruses (Mound, 1996). *Thrips* species in particular can be found throughout the world in flowers and on leaves of a wide variety of plant hosts from grasses to hardwoods. Some are beneficial pollinators while others cause significant economic damage (Palmer, 1992). Distinguishing pest species from the rich native thrips fauna is clearly of economic importance. For economic entomology, it is important to distinguish the diversity on a crop from diversity within a crop since many species are associated with weeds rather than the crop itself (Monteiro et al., 1996). The identity of the host plants and the feeding site of adults and juveniles are important aspects of herbivore biology, but many published 'host records' of thrips species are based solely on the presence of winged adults with no evidence of any biological dependence by the thrips on the named plants (Martin and Mound, 2004). In Malaysia, very little study has been done previously on thrips with their associated host plants and especially their economic importance (Ahmad and Ho, 1980). Although, there have

been various studies on particular groups of Thysanoptera from the Malaysian area (Kudo, 1992, 1996, 1997; Nonaka and Jangvitaya, 1993, 1994; Okajima, 1995a to d; Palmer, 1992; Palmer and Mound, 1978; Tyagi et al., 2008). These were not directed to pest thrips and none is useful to agricultural entomologists. However, due to its' economic importance, there have been a few new studies conducted recently (Mound and Azidah, 2009; Mound and Ng, 2009). Moreover, when a thrips becomes of economic interest, further specimens become available that can lead to a greater understanding of host-plant relationships and the structural variation within and between species.

One such study (Mound and Collins, 2000) reported the Asian-Australian species, *Thrips parvispinus* Karny, causing damage to *Gardenia* plants in a glasshouse in Greece. Thus, the objective of this study is to provide a list of the thrips species found on crops and common plants as a first step towards a biodiversity study of Thysanoptera in Peninsular Malaysia.

MATERIALS AND METHODS

Specimens were collected mainly from the flowers of cultivated

plants in various areas of Peninsular Malaysia, that is, Kuala Lumpur [Institute of Biological Sciences and Rimba Ilmu, University of Malaya (UM)], Selangor [Serdang (Federated Experimental Station; MARDI; University Putra Malaysia; Rice Industry Centre); Taman Serdang Raya, Seri Kembangan; Parit 5, Sekinchan; Taman Agrotek, Batang Berjuntai]; Pahang [Cameron Highlands (MARDI and Taman Sedia, Tanah Rata; Brinchang; Kampong Raja)]; Kelantan [Loajing, Gua Musang]; Terengganu [MARDI, Jerangau]; Perak [Kampung Ijok, Kuala Kurau]. The specimens were collected by beating vegetation (that is, either the flowers or leaves) over a plastic tray. Thrips which fell on the tray were then removed with a fine brush into collecting vials contains 95% alcohol. A small informative label is inserted in the vial. The sampling was conducted between March and November 2008. were collected by beating vegetation (that is, either the flowers or leaves) over a plastic tray. Thrips which fell on the tray were then removed with a fine brush into collecting vials contains 95% alcohol. A small informative label is inserted in the vial. The sampling was conducted between March and November 2008. Collected specimens then underwent a standard dehydration and clearing process by Moritz et al. (2001) before being slide mounted. Slide mounted specimens were identified by using taxonomic keys (Bhatti, 1980, 1999; Moritz et al., 2001, 2004; Mound, 2005; Mound and Azidah, 2009; Mound and Masumoto, 2005; Palmer, 1987, 1992) and were verified by Dr Mound at CSIRO, Canberra. The collections were deposited in the Zoological Museum of the Institute of Biological Sciences.

RESULTS

Thirty two species are here recorded as associated with cultivated plants in Malaysia. Of these 17 were found on more than one species of plant (Table 1).

DISCUSSION

There were 32 species collected in this study and 17 of these were found on more than one species of plant (Table 1). This accords with the statement by Mound (1996) who stated that more than 100 species from about 5,000 species worldwide have been recorded as pests of one or more crops. This study also recorded two further species from Malaysia in addition to those listed in 2009 (Mound and Azidah, 2009). These are *Frankliniella schultzei* on *Solanum melongena* and *Stenchaetothrips biformis* on *Capsicum annum*. However, the first of these is known to be highly polyphagous and the second breeds only on grasses including rice crops. A long term study is needed in order to confirm for many thrips their 'true' host plant or host plants. One good example is by Teulon and Penman (1990) who have produced the most comprehensive list of host plants of any single thrips species worldwide, recorded larvae of the native New Zealand species, *Thrips obscuratus*, from more than 50 plant species. Hence, this result can be considered as guidance for future study. Despite this short term survey, a considerable time was spent on sampling the thrips from *S. melongena* (brinjal), chili (*Capsicum annum*)

and long beans (*Vigna unguiculata*) at the Taman Agrotek, Batang Berjuntai. The collection of thrips from those plants showed that *Megalurothrips typicus* and *Megalurothrips usitatus* are particularly associated with long beans as adult and immature stages were always collected together on the plants. However, it is very interesting that only females of *M. usitatus* and males of *M. typicus* were collected from long beans without the opposite sex of both species. This finding needs further investigation. Besides that, this survey also found that *T. palmi* and *T. parvispinus* are common on chili plants, whilst *Ceratothripoides brunneus* and *T. palmi* are common on brinjal. However, in order to confirm that a reported plant is a 'true' host and not a chance association, it is necessary to rear the larvae of the associated thrips species until adults are successfully produced. Further, they also need to be reared to adults because few larval thrips can be identified to species. In Europe, a putative identification of a thrips can have a high level of accuracy (zur Strassen, 2003) due to the wealth of information concerning biology, structural variation and distributions of so many species. In contrast, in South-east Asia there is a dearth of field observations.

Many species are based on a few casually collected individuals, and there is almost no knowledge either of the plants on which particular species breed or of the range of intraspecific structural variation that might occur. Although a valuable overview of the genus *Thrips* is available that recognized 91 species between Pakistan and the Pacific (Palmer, 1992), this genus is particularly difficult to understand in this region (Mound, 2002). This is because many species are based on single samples, or even single specimens and the original microslide preparations often are excessively poor. Further, for many of these species there is little available information on their biology, geographical distributions, host associations and structural variation, although some of them are well known as pests. Thus, the biological reality of some 'species' needs confirming.

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Table 1. Thripidae species, plants and localities from which they were collected.

Species name	Plant name	Locality
<i>Ayyaria chaetophora</i>	<i>Vigna unguiculata</i> .	Taman Agrotek, Batang Berjuntai, Selangor.
<i>Bathrips melanicornis</i>	<i>Bougainvillea</i> sp.	Institute of Biological Sciences, University of Malaya.
	<i>Ocimum basilicum</i> .	MARDI, Serdang, Selangor.
<i>Ceratothripoides brunneus</i>	<i>Asystasia intrusa</i> .	MARDI, Serdang, Selangor.
	<i>Hibiscus esculentus</i> .	UPM, Serdang, Selangor.
	<i>Impatiens wallariana</i> .	Loajing, Gua Musang, Kelantan.
	<i>Ocimum basilicum</i> .	MARDI, Serdang, Selangor.
	<i>Orthosiphon aristatus</i> .	Rimba Ilmu, University of Malaya.
	<i>Rhodomyrtus tomentosa</i> .	MARDI, Serdang, Selangor.
	<i>Salvia farinacea</i> .	Loajing, Gua Musang, Kelantan
	<i>Solanum melongena</i> .	UPM, Serdang; Taman Agrotek, Batang Berjuntai, Selangor
	<i>Tabernaemontana coronaria</i> .	MARDI, Serdang, Selangor.
	<i>Thunbergia erecta</i> .	RIC, MARDI, Serdang, Selangor.
<i>Thunbergia laurifolia</i> .	MARDI, Serdang, Selangor.	
<i>Vigna unguiculata</i> .	Taman Agrotek, Batang Berjuntai, Selangor.	
<i>Craspedothrips antennalis</i>	<i>Averrhoa carambola</i> .	Institute of Biological Sciences, University of Malaya.
	<i>Tabernaemontana coronaria</i> .	MARDI, Serdang, Selangor.
<i>Danothrips alis</i>	<i>Capsicum annum</i> .	Institute of Biological Sciences, University of Malaya.
<i>Dichromothrips smithi</i>	<i>Arundina graminifolia</i> .	MARDI, Serdang, Selangor.
	<i>Capsicum annum</i> .	MARDI, Tanah Rata, Cameron Highlands.
<i>Frankliniella occidentalis</i>	<i>Fragaria</i> sp.	MARDI and Taman Sedia, Tanah Rata, Cameron Highlands; Loajing, Gua Musang, Kelantan.
	<i>Gerbera</i> sp.	MARDI, Tanah Rata, Cameron Highlands.
	<i>Givera</i> sp.	Brinchang, Cameron Highlands.
	<i>Gladiolus</i> sp.	MARDI, Tanah Rata, Cameron Highlands.
	<i>Hibiscus rosa-sinensis</i>	Loajing, Gua Musang, Kelantan.
	<i>Impatiens wallariana</i>	Brinchang, Cameron Highlands.
	<i>Nasturtium</i> sp.	Kampong Raja, Cameron Highlands.
	<i>Rosa centifolia</i> .	MARDI, Tanah Rata, Cameron Highlands.
	<i>Solanum trovum</i>	MARDI, Tanah Rata, Cameron Highlands.
	<i>Zantedeschia</i> sp.	Brinchang, Cameron Highlands.

Table 1 Contd.

<i>Frankliniella intonsa</i>	<i>Cucumis melo.</i>	FES, Serdang, Selangor.
	<i>Fragaria sp.</i>	MARDI and Taman Sedia, Tanah Rata, Cameron Highlands; Loajing, Gua Musang, Kelantan.
	<i>Hibiscus rosa-sinensis.</i>	Loajing, Gua Musang, Kelantan.
	<i>Impatiens balsamina.</i>	Brinchang, Cameron Highlands.
	<i>Impatiens wallariana.</i>	Brinchang, Cameron Highlands; Loajing, Gua Musang, Kelantan.
	<i>Nasturtium sp.</i>	Kampong Raja, Cameron Highlands.
	<i>Rosa centifolia.</i>	MARDI, Tanah Rata, Cameron Highlands.
	<i>Salvia farinacea.</i>	Loajing, Gua Musang, Kelantan.
	<i>Tagetes erecta.</i>	Loajing, Gua Musang, Kelantan.
	<i>Zantedeschia sp.</i>	Brinchang, Cameron Highlands.
<i>Frankliniella schultzei</i>	<i>Solanum melongena.</i>	Taman Agrotek, Batang Berjuntai, Selangor.
<i>Frankliniella williamsi</i>	<i>Zea mays.</i>	UPM, Serdang, Selangor.
<i>Megalurothrips mucunae</i>	<i>Psophocarpus tetragonolobus.</i>	Institute of Biological Sciences, University of Malaya.
	<i>Solanum melongena.</i>	Taman Agrotek, Batang Berjuntai, Selangor.
<i>Megalurothrips typicus</i>	<i>Averrhoa carambola.</i>	Institute of Biological Sciences, University of Malaya; MARDI, Serdang, Selangor.
	<i>Mangifera indica.</i>	FES, Serdang, Selangor.
	<i>Melastoma malabatricum.</i>	Institute of Biological Sciences, University of Malaya.
	<i>Vigna unguiculata.</i>	Taman Agrotek, Batang Berjuntai, Selangor.
<i>Megalurothrips usitatus</i>	<i>Arundina graminifolia.</i>	Brinchang, Cameron Highlands.
	<i>Hibiscus cannabinus</i>	MARDI, Serdang, Selangor.
	<i>Impatiens wallariana.</i>	Loajing, Gua Musang, Kelantan.
	<i>Sesbenia gandiflora.</i>	MARDI, Serdang, Selangor.
	<i>Solanum melongena.</i>	Taman Agrotek, Batang Berjuntai, Selangor.
	<i>Vigna unguiculata.</i>	Parit 5, Sekinchan; Taman Agrotek, Batang Berjuntai, Selangor.
<i>Microcephalothrips abdominalis</i>	<i>Tagetes erecta.</i>	Loajing, Gua Musang, Kelantan.
	<i>Solanum melongena.</i>	Taman Agrotek, Batang Berjuntai; UPM, Serdang, Selangor.
<i>Scirtothrips dorsalis</i>	<i>Averrhoa carambola.</i>	MARDI, Serdang, Selangor.
	<i>Capsicum annum.</i>	Institute of Biological Sciences, University of Malaya.
	<i>Mangifera indica.</i>	FES, Serdang; Parit 5, Sekinchan, Selangor.

Table 1 Contd.

	<i>Mimosa inversa</i> .	FES, Serdang, Selangor.
	<i>Sandoricum koetjape</i> .	FES, Serdang, Selangor.
<i>Stenchaetothrips biformis</i>	<i>Capsicum annuum</i> .	Taman Agrotek, Batang Berjuntai, Selangor.
<i>Thrips alatus</i>	<i>Nasturtium</i> sp.	Kampong Raja, Cameron Highlands.
	<i>Mangifera indica</i> .	FES, Serdang, Selangor.
<i>Thrips coloratus</i>	<i>Mesuaferrea</i> sp.	UPM, Serdang, Selangor.
	<i>Nephelium mutabile</i> .	MARDI, Serdang, Selangor.
	<i>Melastoma malabatricum</i> .	MARDI, Serdang, Selangor.
<i>Thrips flavus</i>	<i>Vigna unguiculata</i> .	Taman Agrotek, Batang Berjuntai.
	<i>Averrhoa carambola</i> .	MARDI, Serdang, Selangor.
	<i>Ixora finlaysahlana</i> .	Rimba Ilmu, University of Malaya.
	<i>Melaleuca leucadendron</i> .	MARDI, Serdang, Selangor.
<i>Thrips florum</i>	<i>Nasturtium</i> sp.	Kampong Raja, Cameron Highlands.
	<i>Podocarpus polystachyus</i> .	Rimba Ilmu, University of Malaya.
	<i>Quercus</i> sp.	MARDI, Serdang, Selangor.
	<i>Sandoricum koetjape</i> .	FES, Serdang, Selangor.
	<i>Averrhoa carambola</i> .	Institute of Biological Sciences, University of Malaya.
<i>Thrips hanifah</i>	<i>Melaleuca leucadendron</i> .	MARDI, Serdang, Selangor.
	<i>Aleurites triloba</i> .	MARDI, Serdang, Selangor
	<i>Capsicum annuum</i> .	FES, Serdang, Selangor; MARDI, Tanah Rata, Cameron Highlands.
	<i>Carica papaya</i> .	FES, Serdang; Parit 5, Sekinchan, Selangor.
	<i>Durio lowenius</i> .	FES, Serdang, Selangor.
	<i>Impatiens balsamina</i> .	Brinchang, Cameron Highlands.
	<i>Mangifera indica</i> .	FES, Serdang; Parit 5, Sekinchan; Taman. Serdang Raya, Seri Kembangan, Selangor
<i>Thrips hawaiiensis</i>	<i>Mesuaferrea</i> sp.	UPM, Serdang, Selangor.
	<i>Musa</i> sp.	MARDI, Serdang, Selangor.
	<i>Nephelium longana</i> .	FES, Serdang, Selangor.
	<i>Nephelium mutabile</i> .	MARDI, Serdang, Selangor.
	<i>Quercus</i> sp.	MARDI, Serdang, Selangor.
	<i>Rosa centifolia</i> .	MARDI, Tanah Rata, Cameron Highlands.
	<i>Sandoricum koetjape</i> .	FES, Serdang, Selangor.

Table 1 Contd.

	<i>Sesbenia glandiflora.</i>	MARDI, Serdang, Selangor.
	<i>Solanum melongena</i>	Taman Agrotek, Batang Berjuntai; MARDI, Serdang, Selangor.
	<i>Zantedeschia</i> sp.	Brinchang, Cameron Highlands.
	<i>Zea mays.</i>	Parit 5, Sekinchan, Selangor.
<i>Thrips leeuweni</i>	<i>Mangifera indica.</i>	FES, Serdang, Selangor.
	<i>Averrhoa carambola.</i>	Institute of Biological Sciences, University of Malaya; MARDI, Serdang, Selangor.
<i>Thrips levatus</i>	<i>Capsicum annuum.</i>	FES, Serdang, Selangor.
	<i>Nephelium longana.</i>	FES, Serdang, Selangor.
	<i>Sesbenia glandiflora.</i>	MARDI, Serdang, Selangor.
<i>Thrips mirus</i>	<i>Mangifera indica.</i>	FES, Serdang, Selangor.
<i>Thrips morindae</i>	<i>Melaleuca leucadendron.</i>	MARDI, Serdang, Selangor.
<i>Thrips orientalis</i>	<i>Ixora finlaysahlana.</i>	Rimba Ilmu, University of Malaya.
	<i>Arundina graminifolia.</i>	MARDI, Serdang, Selangor.
	<i>Capsicum annuum.</i>	MARDI, Tanah Rata, Cameron Highlands; UPM, Serdang; Taman Agrotek, Batang Berjuntai, Selangor.
<i>Thrips palmi</i>	<i>Cucumis melo.</i>	FES, Serdang, Selangor.
	<i>Cucumis sativus.</i>	UPM, Serdang, Selangor.
	<i>Impatiens balsamina.</i>	Brinchang, Cameron Highlands.
	<i>Solanum melongena.</i>	Parit 5, Sekinchan; Taman Agrotek, Batang Berjuntai; UPM, Serdang, Selangor.
	<i>Solanum trovum.</i>	MARDI, Tanah Rata, Cameron Highlands.
	<i>Capsicum annuum.</i>	MARDI, Tanah Rata, Cameron Highlands; UPM, Serdang; Taman Agrotek, Batang Berjuntai, Selangor.
	<i>Carica papaya.</i>	FES, Serdang, Selangor.
	<i>Cucumis sativus.</i>	UPM, Serdang, Selangor.
	<i>Citrus suhuiensis.</i>	MARDI, Jerangau, Terengganu.
<i>Thrips parvispinus</i>	<i>Ervatamia coronaria.</i>	RIC, MARDI, Serdang, Selangor.
	<i>Hibiscus cannabinus.</i>	MARDI, Serdang, Selangor.
	<i>Hibiscus esculentus.</i>	UPM, Serdang, Selangor.
	<i>Hibiscus rosa-sinensis.</i>	Loajing, Gua Musang, Kelantan.
	<i>Melastoma malabathricum.</i>	MARDI, Serdang, Selangor.
	<i>Solanum melongena.</i>	MARDI, Serdang; Taman Agrotek, Batang Berjuntai; UPM, Serdang, Selangor.
	<i>Solanum trovum.</i>	Brinchang, Cameron Highlands; Kg. Ijok, Kuala Kurau, Taiping, Perak.

Table 1 Contd.

	<i>Tabernaemontana coronaria</i> .	MARDI, Serdang, Selangor.
	<i>Vigna sinensis</i> .	MARDI, Serdang, Selangor.
	<i>Vigna unguiculata</i> .	Taman Agrotek, Batang Berjuntai, Selangor.
<i>Thrips simplex</i>	<i>Zantedeschia</i> sp.	Brinchang, Cameron Highlands.
<i>Thrips unispinus</i>	<i>Averrhoa carambola</i>	Institute of Biological Sciences, University of Malaya.
<i>Trichomothrips trifasciatus</i>	<i>Capsicum annum</i>	Institute of Biological Sciences, University of Malaya.

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