PICTORIAL KEY TO FRUIT FLIES OF THE TRIBE DACINI (DIPTERA, TEPHRITIDAE) OF SRI LANKA

K. TSURUTA, G. B. J. P. RAJAPAKSE AND T. KAWASHITA

NATIONAL PLANT QUARANTINE SERVICES PROJECT
JAPAN INTERNATIONAL COOPERATION AGENCY

KATUNAYAKE, SRI LANKA
(MARCH, 1999)
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ABSTRACT

A pictorial key to the dacine fruit flies occurring in Sri Lanka is given. This key includes both pest and non-pest species totaling 30 species as follows; *Dacus (Callantra) discophorus*, *D. (C.)* sp. 1 (taxon A), *D. (Didacus) keiseri*, *D. (Leptoxyda) persicus*, *Bactrocera (Afrodacus)* sp. 1 (taxon B), members of *Bactrocera* species complex sensu Drew & Hancock(1994) [*B. (B.) dorsalis*, *B. (B.) kandiensis*, *B. (B.) verbascifoliae*, *B. (B.)* sp. 1 (taxon C), *B. (B.)* sp. 2 (taxon D), *B. (B.)* sp. 3 (taxon E), *B. (B.)* sp. 4 (taxon F), *B. (B.)* sp. 5 (taxon G), *B. (B.)* sp. 6 (taxon H), *B. (B.)* sp. 7 (taxon I)], *B. (B.) latifrons*, *B. (B.) correcta*, *B. (B.) zonata*, *B. (B.) versicolor*, *B. (B.)* sp. 8 (taxon J), *B. (B.)* sp. 9 near *nigrotilialis* (taxon K), *B. (Hemigymnodacus) diversa*, *B. (Javadacus) trilineata*, *B. (Paratridacus) garciniæ*, *B. (Parazeugodacus) bipustulata*, *B. (Zeugodacus) cucurbitæ*, *B. (Z.) caudata*, *B. (Z.) gavisa*, *B. (Z.) duplicata*, *B. (Z.)* sp. 1 near *tau* (taxon L).

BACKGROUND

Primary purpose of National Plant Quarantine Services (NPQS) Project is the technical transfer in plant quarantine. Fruit fly faunal survey is one of the main activities in this project, to enumerate the species occurring in Sri Lanka, and the survey is indispensable to decide the species of plant quarantine importance and to set up the quarantine disinfection standard against them.

Almost all species were caught by Steiner-type trap (length 20 cm, diameter 10 cm) with male attractants, Methyl eugenol or Cue-lure in the trapping survey, and several species were found from infested fruits and vegetables in the fruit survey.

Information on fruit flies present in Sri Lanka has been scanty (Tsuruta, 1994, 1996; Tsuruta et al., 1997), even though plant quarantine restrictions have been imposed on those not occurring in the country (Annon, 1981). Hence, a study was initiated in 1993 by K. Tsuruta before the commencement of NPQS project, and main activities were started in 1994 for improvement of identification, mass rearing, and disinfestation techniques related with fruit flies of quarantine importance. According to our island wide survey, about 30 species of dacine fruit flies are now known from Sri Lanka.
ADDITIONAL NOTES

The pictorial key consists of Key 1 to Key 18. First, key to the genera Bactrocera and Dacus is given. Next, keys to the species of the genus Dacus which include 4 species in 3 subgenera, Callantra, Didacus, Leptodya are given and to the species of genus Bactrocera which includes 26 species in 7 subgenera, Afrodacus Bactrocera, Hemigymnodacus, Javadacus, Paratridacus, Parazeugodacus, Zeugodacus are given. Finally morphological difference between dorsalis complex and zonata complex are indicated.

As this key intends to cover most of the known dacine species recorded from Sri Lanka, and considering an urgent requirement of such key, many undescribed species are included. These new species except for one Dacus (Callanta) species will be described elsewhere (Tsuruta & White, in prep.). Several species are not included, as they were still under examination. Regarding economically important species, refer to Tsuruta et al. (1997).

The characters and terminology used here are those of Drew (1989), or White & Hancock (1997). The definition of genus, subgenus, subgenus group and species complex followed those of Drew (1989), and Drew & Hancock (1994).

K. Tsuruta made all drawings based on the specimens collected in Sri Lanka, and on a few of specimens on loan from British Museum (Natural History).

30 species included in this key were listed in Table 1.

We hope that this pictorial key will help smooth identification of fruit flies of Sri Lanka. It could be used by plant quarantine inspectors, entomologists and also by those interested in this fruit fly group.

The staff members mainly engaged in this fruit fly faunal survey are as follows:

H. M. J. Bandara (Plant Quarantine Division, Gannoruwa)
H. Rajapaksa (former staff at NPQS, Katunayake)
S. B. M. U. C. Kahawatta (present staff at NPQS, Katunayake)
G. B. J. P. Rajapaksa (present staff at NPQS, Katunayake)
S. A. H. Sundaraperma (present staff at NPQS, Katunayake)
K. Tsuruta (former JICA expert, Yokohama Plant Protection Station, MAFF, Japan)
T. Kawashita (JICA expert at NPQS project)
SOME OF IMPORTANT CHARACTERS USED IN IDENTIFICATION

Some of characters useful for identification are given below:

1  Head
   (1) Hairs (Setae)
       The place of setae and the numbers.
   (2) Facial spots
       Presence or absence of facial spots, their shape, whether separated circular or combined.
   (3) Antennae
       The length of segments of antenna as compared to the vertical length of head.

2  Thorax
   (1) Lateral post-sutural vitta (stripe)
       Numbers of lateral post-sutural vitta on scutum, their length and width.
   (2) Hair (Setae)
       The place of setae and the numbers.
   (3) Femora (Legs)
       Presence or absence of black markings on femora.

3  Wings
   (1) Costal band
       Costal band whether complete or incomplete, and its spread beyond the vein of R_{4+5}.
   (2) Apical spot
       Presence or absence of apical spot.
   (3) Microtrichia
       Presence or absence of small hairs in the base of cell br.
   (4) Anal streak
       Presence or absence of anal streak.

4  Abdomen
   (1) Pecten
       Presence or absence of pecten on 3rd tergite of male.
   (2) 5th sternite of male
       The shape of 5th sternite whether concavity or not.
ACKNOWLEDGEMENTS

The authors wish to thank Drs. M. H. J. P. Fernando, Director General, Department of Agriculture, S. L. Weerasena, Director, Seeds Certification and Plant Protection Centre, Department of Agriculture, S. M. C. Subasinghe, Head of National Plant Quarantine Service and Y. Ikegami, Team Leader, NPQS Project for their support in conducting our fruit fly survey. We are also grateful to Drs. I. M. White, London, UK and D. L. Hancock, Department of Primary Industries, Queensland, Australia for their valuable comments on each species in our collection.

K. Tsuruta wish to thank M. B. Abeykoon, C. B. Karandawella and J. Amarasena for their assistance in his field and laboratory works. Last but not least we wish to thank staff members of JICA Sri Lanka Office and Headquarter, Tokyo for their assistance in our activities.

REFERENCES


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<tr>
<th>No.</th>
<th>Scientific Name</th>
<th>Temporary Name</th>
<th>Attractant*1</th>
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<td>3</td>
<td><em>Dacus (Didacus) keiseri</em></td>
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<td>-*2</td>
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<td>4</td>
<td><em>Dacus (Leptoxyda) persicus</em></td>
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<td>-*2</td>
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<td><em>Bactrocera (Bactrocera) verbascifoliae</em></td>
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<td>18</td>
<td><em>Bactrocera (Bactrocera) zonata</em></td>
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<td><em>Bactrocera (Bactrocera) versicolor</em></td>
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<td><em>Bactrocera (Hemigymnodacus) diversa</em></td>
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<td>30</td>
<td><em>Bactrocera (Zeugodacus) sp. 1 near tau</em> (taxon L)</td>
<td></td>
<td>C</td>
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</tbody>
</table>

*1 Attractant: M: Methl eugenol, C: Cue-lure, -: Non-response species

*2 Host plants: *Dacus (Didacus) keiseri*: bred from *Diplocyclos palmatus* (Cucurbitaceae)

*3; White & Elson Harris (1992). In Sri Lanka, it was found from Cucurbitaceous flowers.

*4; Probably the same species. (No. 12 & No. 15)

*5; Only one male was attracted. Very rare case.
Key 1

Key to Genera, Subgenera and species

Abdominal terga

fused separate

Genus Dacus Genus Bactrocera

▼

Key 2 ▼ Key 4

Genus Dacus

Genus Bactrocera

Key 2

Key 4
Key 2

Combined length of antenna
longer than vertical length

\[ a + b + c > A \]

Abdominal tergite 1
somewhat shorter than wide

Subgeneric status in this species is tentative, as this character is unfit for the definition given by Drew (1989).

Abdominal tergite 1
longer than wide

Face
entirely black

Scutum
without lateral vittae

Wing
with black marking

Key 3

equal to or less than vertical length

\[ a + b + c < A \]

Abdominal tergite 1
longer than wide

Face
with elongate facial spots

Scutum
with small medial vitta

Wing
with large marking at apical portion

_Dacus (C.) sp. 1 (taxon A)_  _Dacus (C.) discophorus_
Key 3

Abdominal tergite 3 with pecten. Ovipositor normal. Posterior margin of abdominal tergite 5 normal.

Subgenus Didacus

Scutum uniformly black with presutural vittae without lateral vittae.

Dacus (Didacus) keiseri

Subgenus Leptoxyda

with presutural vittae without lateral vittae with elongate Δ shaped medial vitta.

Dacus (L.) persicus

Scutum

without sa setae

without prsc setae

Abdominal tergite 3 with pecten

without pecten cylindrical truncate

Posterior margin of abdominal tergite 5 normal

Dacus (Didacus) keiseri Dacus (L.) persicus
Key 4

Posterior margin of male sternite 5

with deep concavity

with slight concavity

Posterior lobe of surstylus

short

long

Bactrocera group of subgenera

Zeugodacus group of subgenera

Key 13

Scutum

with sa setae

without sa setae

with prsc seta (occasionally missing)

with prsc seta

Subgenus Bactrocera

Subgenus Afrodacus

B. (A.) sp. 1 (taxon B)
Key 6

All femora
without black markings

Key 7

B. (B.) sp. 4 (taxon F)
laggala dorsalis 1

Key 8

At least hind femora
with small black markings

Key 9

All femora
with black markings

Scutum
black to fuscous

Lateral vittae
parallel sided

B. (B.) sp. 4 (taxon F)
laggala dorsalis 1
**Key 7**

Costal band extends beyond the apical center of cell R4+5 becoming broad around apical extremity

---

not extending beyond center of cell R4+5

---

**B. (B.) verbascifoliae**

Lateral vittae broad
0.2–0.23 mm

not broad-ca. 0.14 mm

---

**B. (B.) dorsalis**

Cup-ex area
with weak anal streak

*B. (B.) sp. 1 (Taxon C)*
Hantana dorsalis

with distinct anal streak

*B. (B.) sp. 7 (Taxon I)*
Jambu dorsalis
Key 8

Large species
Wing length ca. 7.5mm

Narrowed part of cell br

with dense microtrichia

with sparse microtrichia

Medium species
Wing length ca. 6mm

Face
with a swelling at anterior portion

without a swelling at anterior portion

B. (B.) sp. 2 (Taxon D)

B. (B.) kandiensis

Large dorsalis
Key 9

Costal band with brown band overlapping along underside of R2+3

normal

Fore femur with small black marking

hind femur with black marking (fore or mid femora sometimes black marking)

Scutum uniformly black to fuscous

with red brown area shown as in illustration

B. (B.) sp. 3 (Taxon E) wide costa dorsalis

B. (B.) sp. 5 (Taxon G) laggala dorsalis 2
Key 10

Costal band
with separate apical spot

normal

Scutellum
without apical marking

with apical marking

Face
with separate spots

with transverse band

with separate spots

B. (B.) zonata
B. (B.) correcta
B. (B.) versicolor
Key 5

Narrowed part of Cell br with microtrichia

Wing with anal streak

without microtrichia

with weak anal streak

Members of Bactrocera zonata complex

Scutum black to fuscous

Abdominal tergites with various markings

all black or without distinct black markings

Members of Bactrocera dorsalis complex

Species not placed in species complex

Key 6

Key 10

Key 11
Key 11

Black species

Costal band
normal

devolving into apical spot

abdominal tergites
black

without distinct black markings

Marking on femora
as in illustrations

with black marking

Face entirely black

with facial spots

B. (B.) sp. near *nigrotibialis*  
(taxon K)  

B. (B.) *latifrons*
Key 12
Brown species

Large species
Wing length ca. 7.5mm
Costal band developing into apical spot
All femora with black markings
Lateral vittae very narrow
Scutum without prsc setae

Medium species
Wing length ca. 6mm
normal
without black marking
tapering posteriorly
with prsc setae

B. (B.) sp. 8 (Taxon J)
Large brown
B. (B.) sp. 6 (Taxon H)
Brown dorsalis
Key 13

No. of scutellar setae
one pair (usually) - two pairs

sa setae
absent - present

Key 16

Subgenus Javadacus
Face entirely pale
Scutum black with small median vitta

Abdominal tergite 3
with pecten - without pecten

Subgenus Hemigymnodacus

B. (J.) trilineata

Key 15
Key 14
Key 14

Face in male
entirely pale

Face in female
with transverse band

Scutum
black with lateral and medial vittae

B. (Hemigymnodacus) diversa
Key 15

Subgenus Zeugodacus (some species)

With lateral vittae with medial vitta

Wing in male
with supernumerary lobe

Subgenus Paradacus not recorded in Sri Lanka

Costal band extending into spot

Wing
with a marking on dm-cu cross vein

B. (Z.) cucurbitae
Key 16

Abdominal tergite 3
with pecten without pecten

Wing
without costal band with supernumerary lobe

Subgenus Paratridacus
Face with facial spots
Costal band broad and developing into somewhat darker apical marking

Subgenus Parazeugodacus
Scutum with small lateral vittae
Scutellum with black band

B. (Parazeugodacus) bipustulata  B. (Paratridacus) garciniae
Key 17
Subgenus Zeugodacus
(some species)

Scutum
with lateral vittae
without medial vitta

Face
with two transverse band

B. (Z.) duplicata

Costal band
not extending into apical spot

Wing
without a marking on dm-cu cross vein

► Key 18

B. (Z.) sp. near tau (Taxon L)
Key 18

Anepisternal stripe
without concavity
at anterior margin

Face
with transverse band

Scutum
without brown area
in anterior portion

with deeply excavated
at anterior margin

with facial spots

with brown area in
anterior portion

B. (Z.) caudata

B. (Z.) gavisa
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