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Tsuruta, Kenji

White, Ian M.

Bandara, H. M. J.

Rajapakse, H.

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A Preliminary Notes on the Host-plants of Fruit Flies of the Tribe Dacini (Diptera, Tephritidae) in Sri Lanka

Kenji TSURUTA

Research Division, Yokohama Plant Protection Station, Ministry of Agriculture. Forestry and Fishieries, Shinyamashita, Yokohama, 23 l Japan

Ian M. WHITE

International Institute of Entomology, London. SW7 5JR UK

H.M.J. BANDARA, H. RAJAPAKSE, S.A.H. SUNDARAPERUMA. S.B.M.U.C. KAHAWATTA, and **G.B.J.P. RAJAPAKSE**

National Plant Quarantine Services, Katunayake, Sri Lanka

Abstract. Host plants including a total of 22 families representing 45 species were recorded for 16 fruit flies of the tribe Dacini in Sri Lanka. *Bactrocera kandiensis* was found to be highly polyphagous, and its host range was as wide as that of *B. dorsalis.* Some host plants of *B. dorsalis, B. kandiensis, B. correcta, B. cucurbitae,* and *B. trilineata* were newly recorded. In addition, host plants of *B. gavisa, B.* sp. near *nigrotibialis, B.* sp. near *tau, Dacus discophorus,* and *D. keiseri* were recorded for the first time. Host plants of 46 % Sri Lankan Dacini are now known.

Key words: Biology, Diptera, fruit flies, Dacini, host plants, Sri Lanka.

Introduction

Host plants of fruit flies of the tribe Dacini in Sri Lanka have never been investigated exhaustively. Although a total of 5 famillies (Cucurbitaceae, Solanaceae, Anacardiaceae. Clusiaceae, Rosaceae) representing 12 species have been reported for 6 fruit fly species to date (Anon, 1923), the taxonomy and host plant records of fruit flies in Sri Lanka needed to be totally updated.

A fruit fly fauna1 survey using trapping and fruit collection methods was conducted by a JICA programme (NPQS Project) for three years (1993-1996) in Sri Lanka. About 35 species, of which 32 species (28 *Bactrocera* spp. and 4 *Dacus* spp.) were recorded in our survey, are now known to be present in Sri Lanka.

Following a programme of fruit collection and rearing, 45 host species (in 22 families) of 16 Dacini species, are reported here. This includes 3 species that will be described elsewhere and these are here refered to as *B.* sp. near *nigrotibialis* (taxon A). and *B.* sp. (taxon B) , *B.* sp. near *tau* (taxon C), respectively.

Method

The collection method for infested fruit followed Drew (1982). Collections of both cultivated and wild fruits, and vegetables, were made from more than 100 localities covering almost all of agro-ecological regions. The definition of each climate zone (wet. intermediate, and dry zone), and bands of elevation above sea level (low-, mid-. and up-countries) were given in the agro-ecological regions in Sri Lanka. (Anon, Survey Dept.).

Fruits were brought to the laboratory, then kept for a few weeks and up-to 1 month. Emerged flies were kept alive for several days. While waiting for color and hardening of the body, water and adult food (dry yeast, pepton and sugar) were given. Then after killing, flies were mounted and labeled.

The identification of common host plants was carried out by a staff at NPQS. Katunayake, and uncommon species were sent to the National Herbarium. Department of Agriculture, Sri Lanka or to M. D. Dassanayake , Prof. Emeritus of Botany, Peradeniya Univ. for identification. The names of cultivated host plant generally follow those used by White & Elson-Harris (1992), and those of wild hosts follow "A revised handbook to Flora of Ceylon I-IX" (Dasanayake ed. 1980~) or Bandaranayake et al. (1974).

I Notes on the fruit flies for which host plants were recorded.

1 ***Bactrocera (Bactrocera) correcta*** (Bezzi)

This species is widely distributed, with dense populations, throughout the Island in wet and dry zones from low to up-countries, to the elevation of 1200 m. Although 8 plant families including 9 species were recorded for this species, no major host plant was recorded. *Annona* sp. (Annonaceae), *Garcinia xanthochymus* (Clusiaceae). *Strychnos patatorum* (Loganiaceae) appear to be new records.

Host plants: *Annona* sp., *Carissa carandas, Garcinia xanthochymus*, Madhuca longifolia, Mangifera indica, Psidium guajava, Syzygium* **jumbos,** *Strychnos potatorum*, Terminalia catappa.*

2. ***Bactrocera (Bactrocera) dorsalis*** (Hendel)

Serious pest of wide range of both cultivated and wild plants. This species is widely distributed throughout the Island under the climate of wet and dry zones from low to up-countries. 13 plant families including 18 species were recorded. *Garcinia xanthochymus* (Clusiaceae), *Syzygium aromaticum* (Myrtaceae) and *Citrus x madurensis* (Rutaceae) appear to be newly recorded hosts for B. *dorsalis.*

Host plants: *Anacardium occidentale, Annona squamosa, Artocarpus heterophyllus, Careya arborea, Carica papaya, Chrysophyllum roxburghii*, Citrus x madurensis*,*

*Garcinia xanthochymus**, *Mangifera indica, Per-sea americana, Psidium guajava, Punica granatum, Spondias cytherea, Spondias pinnata, Strychnos nux-vomica, Syzygium aromaticum**, *Syzygium jambos, Terminalia catappa.*

3. ***Bactrocera (Bactrocera) kandiensis*** Drew & Hancock

This endemic species was recently described by Drew and Hancock (1994) with known records of 2 host plants: *Mangifera indica* and *Garcinia* sp. 13 plant families including 21 species in which 11 families representing 19 species are new records. This species as well as *B. dorsalis* is distributed widely throughout the Island in wet and dry zones from low to up-countries, to the elevation of 1200m .

Host plants: *Anacardium occidentale**, *Annona glabra**, *Areca catechu**, *Artocarpus heterophyllus**, *Artocarpus nobilis**, *Averrhoa carambola**, *Carica papaya**, *Careya arborea**, *Citrus x madurensis**, *Citrus maxima**, *Chrysophyllum roxburghii**, *Garcinia xanthochymu **, *Mangifera indica, Mangifera zeylanica**, *Spondias cytherea**, *Spondias pinnata**, *Persea americana**, *Psidium guajava**, *Punica granatum**, *Syzygium aromaticum**, *Syzygium jambos".*

4. ***Bactrocera (Bactrocera) latifrons*** (Hendel)

This species is distributed in dry and wet zones from low to mid country. and primarily attacks Solanaceae. Only one host plant was recorded.

Host plant: *Solanum xanthocarpum.*

5. ***Bactrocera (Bactrocera) zonata*** (Saunders)

This species is widely distributed throughout the Island in wet and dry zones from low to up-countries, to the elevation of 1800m. Only 2 plant families including 2 species were recorded. *Careya arborea* is the major host plant.

Host plants: *Careya arborea, Terminalia catappa.*

6. ***Bactrocera (Bactrocera)*** sp. near *nigrotibialis* (taxon A)

Although this undescribed species is widely distributed throughout the Island in wet and dry zones from low to up-countries, to the elevation of 1200 m, only one host plant was recorded.

Host plant: *Terminalia catappa.*

7. ***Bactrocera (Bactrocera)*** sp. (taxon B)

This undescribed speceis was only recorded from *Syzygium jambos.*

Host plant: *Syzygium jambos".*

8. Bactrocera (Hemigymnodacus) diversa (Coquillett)

This speceis was reared from male flowers of pumpkin. This species is known to be attracted by methyl eugenol in India, but was not attracted by lure baited traps in this survey.

Host plant: *Cucurbita maxima* (male flower).

9. ***Bactrocera (Javadacus) trilineata*** (Hardy)

This species is mainly distributed in the dry zone but was also recorded in the wet zone-mid countries. This speceis was reared from flowers of pumpkin.

Host plant: *Cucurbita maxima* (floweres).

10. ***Bactrocera (Paratridacus) garciniae*** (Bezzi)

This species was reared from *Garcinia xanthochymus* on which a heavy infestation was observed. This speceis was recorded in the intermediate and wet zones from low to mid countries, to the elevation of 500m.

Host plant: *Gurcinia xanthochymus.*

11. ***Bactrocera (Zeugodacus) cucurbitae*** (Coquillett)

This species is distributed widely throughout the Island in wet and dry zones from low to up-countries, to the elevation of 2000m. 4 plant families (Cucurbitaceae. Passifloraceae, Pandanaceae , Caricaceae), and 12 species were recorded as follows.

Host plants: *Carica papaya, Coccinia grandis, Cucurbita maxima, Cucumis sativus, Diplocyclos palmatus, Lagenaria siceraria, Luffa acutangula, Momordica charantia, Pandanus odoratissimus*, Passiflora edulis, Strychnos nux-vomica, Trichosanthes cucumerina* and an insect gall on a cucurbit plant.

12. ***Bactrocera (Zeugodacus) gavisa*** (Munro)

This species is distributed in both dry and wet zones from low to up- countries, to the elevation of 1200m.

Host plant: *Capparis roxburghii*.*

13. ***Bactrocera (Zeugodacus)*** sp. near *tau* (taxon C)

This species is mainly distributed in the wet zone from low to mid countries in contrast to B. *cucurbitue* which has a much wider range of distribution in wet and dry zones from low to up-countries. 2 families including 7 species were recorded. *Adenia palmata* and *Passiflora edulis* appear to be new records. Further taxonomic study needs to be undertaken on the status of this species.

Host plants: *Adenia palmata*, Cucumis sativus, Lagenaria siceraria, Luffa acutangula, Momordica charantia, Passiflora edulis*, Trichosanthes cucumerina.*

14. ***Dacus (Callantra) discoplzorus*** (Hering)

Since the description of this species (Hering,1956), no host record has been made. Only one plant species was recorded.

Host plant: *Wattakaka volbilis* (= Dregea volbilis).*

15. Dacus (Didacus) ciliatus Loew

This species was reared from flower of pumpkin, and 2 other cucurbitaceous plants. Presence of this species in Sri Lanka has been the matter of dispute, but it was confirmed.

Host plants: *Citrullus colocynthis, Cucurbita maxima, Momordica charantia.*

16. ***Dacus (Didacus) keiseri*** (Hering)

Since the description of this species (Hering, 1956), no host record has been made. 2 species of cucurbitaceous plants were recorded.

Host plants; *Diplocyclos palmatus**, *Melothria maderaspatana**.

II. Host plants and their assosiated fruit flies.

Each fruit fly species is followed by collection locality and total no. of specimens recorded. Locality without no. indicates that the number of emerged flies is not recorded for the locality.

1. Anacardiaceae (the Sumac Family)

1. *Anacardium occidentale* L. cashew

Bactrocera (Bactrocera) dorsalis (Hendel)
Katunayake 1, Negombo 14.

Bactrocera (Bactrocera) kandiensis Drew & Hancock
Katunayake 1, Negombo 22.

2. *Mangifera indica* L. mango

Bactrocera *(Bactrocera) dorsalis* (Hendel)
Negombo 97, Makandura 45, Nalanda 9, Gannoruwa 14, Katunayake 19. Chilaw 44, Muthuwadiya 49, Lunawa 17, Murutalawa 11, Pasyala 61. Lenadora 14, Uraniya 13, Mahailluppallama 17, Andiambalama 2. Kiralogama, Lakpahana 5, Ambepussa 8, Dodangolla 21. Penideniya 4. Monaragala 3, Hingurakgoda 9, Urapola , Kundasale 3, Mailapitiya 3. Pelwehera 3, Tabbowa 6, Kowinna 3.

Bactrocera *(Bactrocera) kandiensis* Drew & Hancock
Andiambalama 18, Negombo 25, Nalanda 43, Monaragala 85, Ibbakatuwa 36, Gannoruwa 20, Kowinna 7, Kundasale 23, Pasyala 68, Ambepussa 21. Murutalawa 42, Lenadora 42, Dodangolla 11, Pelwehera 5 1, Penideniya 14. Uraniya 9, Mahaillupallama 5, Mailapitiya 9, Girandurukotte 6, Katunayake 3, Hingurakgoda 10, Kiralogama 1, Lakpahana 1, Muthuwadiya 18, Lunava 3, Haguranketha 1.

Bactrocera (Bactrocera) correcta (Bezzi)
Hingurakgoda 2.

3. *Mangifera zeylanica* (Blume) Hook. f.

Bactrocera (Bactrocera) kandiensis Drew & Hancock
Illukkumbura 3.

4. *Spondias cytherea* Sonn. jew plum

Bactrocera (Bactrocera) dorsalis (Hendel)
Urapola 1, Negombo 4.

Bactrocera (Bactrocera) kandiensis Drew & Hancock
Urapola 1.

5. Spondias pinnata (L.f.) Kurz
Bactrocera (Bactrocera) dorsalis (Hendel)
Urapola 3.

2. Annonaceae (the Custard-Apple Family)

6. *Annona squamosa* L. sugar-apple
Bactrocera (Bactrocera) dorsalis (Hendel)
Peradeniya 2.

7. *Annona glabra* L. pond-apple
Bactrocera (Bactrocera) kandiensis Drew & Hancock
Katunayake 18.

8. *Annona* sp.
Bactrocera (Bactrocera) correcta (Bezzi)
Peradeniya 2.

3. Apocynaceae (the Dogbane Family)

9. *Carissa carandas* L. karanda
Bactrocera (Bactrocera) correcta (Bezzi)
Peradeniya 2.

4. Asclepiadaceae (the Milkweed Family)

10. *Wattakaka volbilis* (L.)
Dacus (*Callantra*) *discophorus* (Hering)
Negombo 309, Pamunugama 89, Thoduwawa.

5. Caricaceae (the Papaya Family)

11. *Carica papaya* L. papaya
Bactrocera (Bactrocera) dorsalis (Hendel)
Kiralogama 12.
Bactrocera (Bactrocera) kandiensis Drew & Hancock
Kiralogama 8.
Bactrocera (Bactrocera) cucurbitae (Coquillett)
Kiralogama 4.

6. Capparidaceae (the Caper Family)

12. Capparis roxburghii DC.
Bactrocera (Zeugodacus) gavisa (Munro)
Karuwalagesvawa 2.

7. Clusiaceae (the Mangosteen Family)

13. *Garcinia xanthochymus* Hook.f.ex T. And. **egg** tree
Bactrocera (Bactrocera) correcta (Bezzi)
Peradeniya 1.
Bactrocera (Bactrocera) dorsalis (Hendel)
Peradeniya 3.
Bactrocera (Bactrocera) kandiensis Drew & Hancock

Peradeniya 5.
Bactrocera (*Paratridacus*) *garciniae* (Bezzi)
Peradeniya 6, Kotiyakumbura.

8. **Combretaceae (the Indian Almond Family)**

14. Terminalia catappa L. tropical almond
Bactrocera (Bactrocera) correcta (Bezzi)
Penideniya 7.
Bactrocera (Bactrocera) dorsalis (Hendel)
Kadanegedara 12, Marawila 35.
Bactroceru (Bactroceru) kundiensis Drew & Hancock
Marawila 5, Attanagalla 32, Penideniya 1, Rathnapura.
Bactroceru (Bactroceru) sp. near *nigrotibialis* (taxon A)
Gannoruwa 6.
Bactroceru (Bnctrocera) zonata (Saunders)
Penideniya 15, Attanagalla 23.

9. **Cucurbitaceae (the Cucurbit Family)**

15. *Citrullus colocynthis* (L.) Shrad. bitter cucumber
Dacus (Diducus) ciliatus Loew
Talawila.
16. *Coccinia grandis* (L.) Voigt ivy gourd
Bactrocera (Zeugodacus) cucurbitae (Coquillett)
Meddegama 5.
17. *Cucumis sativus* L. cucumber
Bactrocera (Zeugodacus) cucurbitae (Coquillett)
Madabavita 2, Katunayake 2.
Bactrocera (*Zeugodacus*) sp. near *tau* (taxon C)
Madabavita 2.
18. *Cucurbita maxima* Duchesne pumpkin
Bactrocera (Zeugodacus) cucurbitue (Coquillett)
Palakuda, Wattala.
Bactroceru (Hemigymnodacus) diversa (Hendel)
Katunayake 3, Rabukkane, Talawila, Kandakaduwa, Palakuda. Wattala.
Bactroceru (*Javadacus*) *trilineata* (Hardy)
Lunuwilla 1.
Dacus (Didacus) ciliatus Loew
Kandakuliya 3, Talawila.
19. *Lagenaria siceraria* (Molina) Standley white-flowered gourd
Buctrocera (*Zeugodacus*) *cucurbitae* (Coquillett)
Madabavita 22.
Buctrocera (Zeugoducus) sp. near *tau* (taxon C)
Madabavita 2.
20. *Diplocyclos palmatus* (L.) C. Jeffrey
Bactrocera (Buctrocera) cucurbitae (Coquillett)
(flower): Kiralogama 46, Kalakaradawa 1, Laggala 3. (gall): Laggala 13.

Dacus (Diducus) keiseri (Hering)
Kiralogama 38, Bibile, Ambana.

21. *Luffa acutangula* (L.) Roxb. angled luffa
Bactrocera (Zeugoducus) *cucurbitae* (Coquillet)
Wariyapola 22, Dankotuwa 13, Pilimatalawa 22, Nalanda 24, Pelwehera 18. Madavavita 5, Thodu.
Bactrocera (Zeugoducus) sp. near *tau* (taxon C)
Pilimatalawa 5, Pelwehera 2.

22. *Momordica charantia* L. bitter gourd
Bactroceru (Zeugodacus) cucurbitae (Coquillett)
Dankotuwa 15, Nalanda 10, Katunayake 6, Wariapola 4, Bibile 4. Lunuwila 4, Ambeppusa.
Bactroceru (Zeugoducus) sp. near *tau* (taxon C)
Ambana 8.
Dacus (Didacus) ciliatus Loew
Talawila.

23. *Melothria maderaspatana* (L.) Cogn.
Dacus (Didacus) keiseri (Hering)
Kiralogama.

24. *Trichosanthes cucumerina* L. snakegourd
Bactrocem (Zeugoducus) cucurbitae (Coquillett)
Marassana 7, Pelwehera 10, Nalanda 9, Tabbowa 14, Ambana 7. Katunayake 19, Thoduwawa, Eraminigolla.
Bactrocera (Zeugoducus) sp. near *tau* (taxon C)
Marassana 1, Pelwehera 2.

10. Lauraceae (the Laurel Family)

25. *Persea americana* Miller **avocado**
Bactrocera (Bactrocera) dorsalis (Hendel)
Peradeniy a 10.
Bactrocera (Bactrocera) kandiensis Drew & Hancock
Peradeniya 31, Gannoruwa 20, Haloluwa 4, Kadugannawa 31. Bindunuwewa 31, Keppetipola 6, Mavanalla.

11. Lecythidaceae (the Brasil-nut Family)

26. *Careya arborea* Roxb. patana oak
Bactrocem (Bactroceru) dorsalis (Hendel)
Negombo 1.
Bactrocera (Bactrocera) kandiensis Drew & Hancock
Negombo 1.
Bactrocera (Bactroceru) zonata (Saunders)
Makandura 60, Meddegama 7, Negombo 8.

12. Loganiaceae (the Logania Family)

27. *Strychnos potatorum* L. f. clearing-nut tree
Bactrocera (Bactrocera) correcta (Bezzi)

Raj anganaya 5.

28. *Strychnos nux-vomica* L. strychine tree

Bactroceru (*Zeugodacus*) *cucurbitae* (Coquillett)
Kalpitiya, Udabaddava.

Bactrocera (Bactrocera) dorsalis (Hendel)
Udabaddava.

13. Moraceae (the Mulberry Family)

29. *Artocarpus nobilis* Thw. wild breadfruit

Bactrocera (Bactrocera) kandiensis Drew & Hancock
Minuwangoda 4.

30. *Artocarpus heterophyllus* Lam. jackfruit

Bactrocera (Bactrocera) dorsalis (Hendel)
Andiambalama 12, Muthuwadiya 5, Peradeniya 1.

Bactrocera (Bactrocera) kandiensis Drew & Hancock
Minuwangoda 27, Peradeniya 47, Muthuwadiya 121, Eraminigolla 2 1, Andiambalama.

14. Myrtaceae (the Murtle Family)

3 1. *Psidium guajava* L. common guava

Bactrocera (Bactroceru) correctu (Bezzi)
Girandurukotte 2.

Bactroceru (Bactrocera) dorsalis (Hendel)
Gannoruwa 7, Peradeniya 8, Pasyala 12.

Bactrocera (Bactrocera) kandiensis Drew & Hancock
Gannoruwa 19 1, Pasyala 5 1, Polpitiya 16, Girandurukotte 6, Horana 2, Lenadora 11, Horana 2, Bindunuwewa 27, Rahangala 1.

32. *Psidium littorale var. Zongipes (0.* Berg.) Fosb. Chinese guava

Bactrocera (Bactrocera) kandiensis Drew & Hancock
Haputale, Bandarawela.

33. *Syzygium aromaticum* (L.) Merr. & Perry. clove

Bactrocera (Bactrocera) dorsalis (Hendel)
Matale 5.

Bactrocera (Bactrocera) kandiensis Drew & Hancock
Matale 1.

34. *Syzygium jumbos* (L.) Alston rose-apple

Bactrocera (Bactroceru) correctu (Bezzi)
Negombo 1.

Bactrocera (Bactroceru) dorsalis (Hendel)
Peradeniya 1.

Bactrocera (Bactrocera) kandiensis Drew & Hancock
Peradeniya 3, Negombo 1.

Bactrocera (Bactrocera) sp. (taxon B)
Penideniya 8.

15. Oxalidaceae (the Wood-Sorrel Family)

35. *Averrhoa carambola* L. starfruit
Bactrocera (Bactrocera) kandiensis Drew & Hancock
Bandirippuwa.

16. Palmae (the Palm Family)

36. *Areca catechu* L. betel nut
Bactroceru (Bactrocera) kandiensis Drew & Hancock
Dhela.

17. Pandanaceae (the Screw-Pine Family)

37. *Pandanus odoratissimus** L. f.
Bactroceru (Bactrocera) cucurbitae (Coquillett)
Pamunugema 2.

18. Passifloraceae (the Passion-flower Family)

38. *Passiflora edulis* Sims purple granadilla
Bactrocera (Bactrocera) cucurbitae (Coquillett)
Bombuwela 7, Gannoruwa.
Bactrocera (Bactrocera) sp. near *tau* (taxon C)
Bombuwela 3.
39. *Adenia palmata* (Lam.) Engl.
Bactrocera (Bactrocera) cucurbitae (Coquillett)
Kotiyakumbura 3.
Bactrocera (Bactrocera) sp. near *tau* (taxon C)
Kotiyakumbura 37 1.

19. Punicaceae (the Pomegranate Family)

40. *Punica granatum* L. pomegranate
Bactrocera (Bactrocera) dorsalis (Hendel)
Marawila 1, Tabbowa.
Bactrocera (Bactrocera) kandiensis Drew & Hancock
Marawila 3.

20. Rutaceae (the Rue Family)

41. *Citrus x madurensis* Lour.
Bactroceru (Bactrocera) dorsalis (Hendel)
Amithirigala 1.
Bactrocera (Bactrocera) kandiensis Drew & Hancock
Amithirigala 7.
42. *Citrus maxima* (Burman) Merr. Pomelo
Bactroceru (Bactrocera) kandiensis Drew & Hancock
Katugastota.

21. Sapotaceae (the Sapodilla Family)

43. *Chrysophyllum roxburghii G.* don.
Bactrocera (Bactrocera) dorsalis (Hendel)

Yakwila 8.

Bactrocera (Bactrocera) kandiensis Drew & Hancock

Madavavita 13, Yakwila 6.

44. *Madhuca longifolia*

Bactrocera (Bactrocera) correcta (Bezzi)

Karuwalagasvawa.

22. **Solanaceae (the Potato Family)**

45. *Solanum xanthocarpum* Schrad

Bactrocera (Bactrocera) latifrons (Hendel)

Kiralogama.

Discussion

Host plant records are important both for applied purposes such as development of control measures or evaluation of pest status, and for defining the genera of the tribe Dacini, or subgenera within each genus. Host plant records are also important in that distribution of host plants will be a major factor determining distribution range or habitat of an each fruit fly species.

Host plants of 16 out of 35 Dacini species so far known to occur in Sri Lanka were recoded. Host plants are known for 3 out of 14 undescribed species known to us (Tsuruta & White in prep.).

Many major host plants of *B. dorsalis, B. kandiensis,* and *B. cucurbitae*, which are distributed widely throughout the Island, have been recorded. As the host range of *B. kandiensis* is as wide as that of *B. dorsalis,* the pest status of *B. kandiensis* appears to be comparable to that of *B. dorsalis* in Sri Lanka. Although *B. correcta, B. zonata* and *B.* sp. near *nigrotibialis* (taxon A) are widely distributed in dense populations throughout the Island, their major host plants have yet to be discovered. Conversely, host plants of rare species such as *Dacus (Didacus) keiseri* and *D. (Callantra) discophorus* have been recorded for the first time. The former is endemic to Sri Lanka. The presence of *Dacus (Didacus) ciliatus* in Sri Lanka was confirmed based on the specimens reared from pumpkin flowers. This survey confirmed the importance of the cucurbit flowers as hosts for some *B. (Zeugodacus)* spp. and *Dacus* spp. The host plants of *B. gavisa* and *B. trilineata* were found to be species of Capparidacea and Cucurbitacea, respectively.

Clearly many more host relationships remain to be discovered. The host plants reported here should be regarded as a basis for future investigation.

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