

Factsheet *Bactrocera zonata* (Saunders)

Original name: *Dasyneura zonatus* Saunders, 1842: 61.

Vernacular name: Peach fruit fly

Formal redescription (after White, 2006)

Wing length, 5.2-6.1 mm.

Head. Pedicel+first flagellomere not longer than ptilinal suture. Face, antennal furrow with a dark spot. Frons, frontal setae 2, orbital seta 1.

Thorax. Scutum predominantly red-brown; postpronotal lobe yellow; notopleural callus yellow; notopleural xanthine absent; lateral postsutural vitta present; medial postsutural vitta absent. Scutellum without any dark patterning (except for basal dark margin). Anepisternum with a stripe from notopleural callus to (or almost to) katepisternum; extended onto katepisternum. Lateroterga with a single xanthine across both anatergite and katatergite. Thoracic setae. Anterior notopleural seta present; anterior supra-alar seta present; prescutellar acrostichal seta present; basal scutellar seta absent.

Wing. Basal cells bc and c without an almost complete covering of microtrichia; cell bm without microtrichia. Narrow subbasal raised section of cell br without microtrichia. Crossvein R-M beyond middle of cell dm. Costal band absent (reduced to a small apical spot). Anal streak absent (trace within bcu only). Cells bc and c hyaline. Without any crossbanding.

Legs. Femora pale coloured. Abdomen. Predominantly fulvous; shape and patterning, see image (CD-C). Tergites II-V separate.

Male. Tergite III with pecten, dense microtrichia adjacent end A_1+Cu_2 , and hindtibia preapical "pad". Basal costal sections without specialised setae. Female. Aculeus pointed; no torsion; length, 1.0-1.2 mm.

Encyclopedia of Life link: <http://eol.org/pages/724418/overview>

DNA barcoding

Multiple reference DNA barcodes from the species distribution are available on the Barcode of Life Data Systems (BOLD) at :

http://www.boldsystems.org/index.php/Taxbrowser_Taxonpage?taxon=Bactrocera+zonata&searchTax=

In BOLD (March 2017), *B. zonata* is recovered in two main monospecific BINs (clusters). For this reason, DNA barcoding might be considered as a suitable tool for the molecular identification this species.

Biology

Bactrocera zonata can complete its life cycle in about 61 days at 25°C (Duyck et al., 2007). Females of *B. zonata* can live up to 18 weeks. Females start laying eggs in fruit between 2 and 3 weeks after adult emergence. Eggs are laid under the fruit skin and are usually white to creamy yellow in colour. The maximum number of eggs laid per day by one female is 13 (Duyck et al., 2007). The total number of eggs laid in a lifetime of a female was calculated at 303 (Duyck et al., 2007). Eggs hatch into larvae which feed on the fruit pulp. There are three larval instars. The total duration of the larval stages vary from 4 to 30 days at 35°C to 15°C respectively (Duyck et al., 2004). Fully fed larvae burrow into the soil where they pupate. The pupal development takes between 8 and 53 days, at between 35°C and 15°C respectively (Duyck et al., 2004). Thereafter an adult fly emerges and the cycle continues.

Host plant list

It is a polyphagous species, although the known host range in Africa is rather limited. It includes a number of commercial hosts such as mango, papaya and peach. In its native range it is reported from a much larger range of commercial and wild hosts (Allwood et al., 1999). Throughout its African range it is recorded from the hosts listed in the table below.

PlantFamily	PlantLatinName	PlantCommonNameEnglish
Anacardiaceae	Mangifera indica	mango
Annonaceae	Annona reticulata	custard apple
Caricaceae	Carica papaya	papaya, pawpaw
Combretaceae	Terminalia catappa	tropical almond
Lauraceae	Persea americana	avocado
Moraceae	Ficus carica	common fig
Myrtaceae	Psidium guajava	common guava
Myrtaceae	Syzygium jambos	rose-apple
Myrtaceae	Syzygium samarangense	java apple
Rhamnaceae	Ziziphus mauritiana	indian jujube
Rosaceae	Eriobotrya japonica	loquat
Rosaceae	Prunus persica	peach
Rutaceae	Citrus sp.	

Additional information on African host records and associated specimens can be found on :

<http://projects.bebif.be/fruitfly/taxoninfo.html?id=163>

Information on host range worldwide can be found on the USDA Compendium of Fruit Fly Host Information (see Liquido et al., 2016).

Impact & management

In Africa, losses incurred by *Bactrocera zonata* can be substantial, especially on mangoes and peaches as reported from Egypt (Cayol et al., 2002).

Management for this species is, as for most fruit fly pests, most efficient using an IPM (Integrated Pest Management) program, including aspects such as orchard sanitation, bait sprays, mass trapping, male annihilation technique among others. General reviews on the current IPM components applied in Africa can be found in chapters 13 to 20 of Ekesi et al. (2016).

SIT (Sterile Insect Technique) application specifically for this species has been used in suppression programmes in Mauritius (Sookar & Deguine, 2016).

Attractants & trapping

Both sexes can be attracted by protein bait products such as liquid protein baits (Torula yeast), three component Biolure and two component Biolure (Ammonium acetate and Trimethylamine) (Sookar et al., 2006).

Male flies can be attracted by the following lures: methyl eugenol

General information on trapping, types of traps, lures and required density of trapping stations can be found in IAEA (2013), Shelly et al. (2014), and Manrakhan (2016).

Distribution

The occurrence of *Bactrocera zonata* in Africa is currently limited to Egypt, Libya and Sudan in the northeast of mainland Africa, the Arabian peninsula and the islands of Mauritius and Reunion in the Western Indian Ocean. The dispersal into Libya and Sudan is a recent expansion of its distribution range and there is a need for intensive surveillance to monitor its potential further spread into Africa.

Distribution map for Africa, based upon specimen records with georeferences is available at:

<http://projects.bebif.be/fruitfly/taxoninfo.html?id=163>

For worldwide distribution, see GBIF: <http://www.gbif.org/species/8021093>

Quarantine regulations

Bactrocera zonata is on the A2 quarantine pest list of EPPO and is a quarantine pest in Jordan and New Zealand (<https://gd.eppo.int/taxon/DACUZO/categorization>).

Others

CABI Plantwise factsheet on *B. zonata* can be found at:

<http://www.plantwise.org/knowledgebank/datasheet.aspx?dsid=17694>

CABI invasive species compendium on *B. zonata* can be found at:

<http://www.cabi.org/isc/datasheet/17694>

REFERENCES

- Allwood, A.J., A. Chinajariyawong, R.A.I. Drew, E.L. Hamacek, D.L. Hancock, C. Hengsawad, J.C. Jipanin, M. Jirasurat, C. Kong Krong, S. Kritsaneepaiboon, C.T.S. Leong & S. Vijaysegaran. 1999. Host plant records for fruit flies (Diptera: Tephritidae) in South East Asia. The Raffles Bulletin of Zoology suppl 7: 1-92.
- Cayol, J.P., Y. Roessler, M. Weiss, M. Bahdousheh, M. Omari, M. Hamalawi & A. Almughayyar. 2002. Fruit fly control and monitoring in the Near East: shared concern in a regional transboundary problem, in: Barnes, B.N. (Ed.), 6th International fruit fly symposium. Isteg scientific publications, Stellenbosch, South Africa, pp. 155-171
- Duyck, P.F., J.F. Sterlin & S. Quilici. 2004. Survival and development of different life stages of *Bactrocera zonata* (Diptera: Tephritidae) reared at five constant temperatures compared to other fruit fly species. Bulletin of Entomological Research 94:
- Duyck, P.F., P. David & S. Quilici. 2007. Can more K-selected species be better invaders? A case study of fruit flies in La Reunion. Diversity and Distributions 13: 535-543
- Ekesi, S., S.A. Mohamed & M. De Meyer (Eds). 2016. Fruit fly research and development in Africa – Towards a sustainable management strategy to improve Horticulture, Springer Verlag, xx + 778pp.
- IAEA. 2013. Trapping manual for area-wide fruit fly programmes. IAEA, Vienna, 46pp.
- Liquido, N., G. McQuate & K. Suiter. 2016. USDA Compendium of fruit fly host information (CoFFHI). Proceedings of the 9th International Symposium on Fruit Flies of Economic Importance 420-434.
- Manrakhan, A. 2016. Detection and monitoring of fruit flies in Africa. In: Ekesi, S., S.A. Mohamed & M. De Meyer (Eds) Fruit Fly Research and Development in Africa. Springer Verlag, 253-273.
- Shelly, T., N. Epsky, E.B. Jang, J. Reyes-Flores & R. Vargas (Eds). 2014. Trapping and the detection, control, and regulation of tephritid fruit flies. Springer Verlag, Dordrecht, xv+638pp.
- Sookar, P., Permalloo, S., Alleck, M., Seewooruthun, S.I., 2006. Development of improved attractants and their integration into fruit fly management programmes, in: Sugayama, R.L., Zucchi, R.A., Ovruski, S.M., Sivinski, J. (Eds.), 7th International Symposium on fruit flies of Economic Importance. Biofabrica Moscamed Brasil, Salvador, Brazil, pp. 71-79.
- Sookar, P. & J.-P. Deguine. 2016. Integrated management of fruit flies: case studies from the Indian Ocean islands. In: Ekesi, S., S.A. Mohamed & M. De Meyer (Eds) Fruit Fly Research and Development in Africa. Springer Verlag, 629-669.
- White, I.M. 2006. Taxonomy of the Dacina (Diptera: Tephritidae) of Africa and the Middle East. African Entomology Memoir 2: 156pp.

This factsheet is compiled within the framework of two network projects: The “ERAfrica_NI_027 Fruit Fly” project and the networking project “BL/37/FWI 08 FRUITFLY” funded by the Belgian Science Policy. Data are provided by collaborators of the following institutions: Centre de coopération internationale en recherche agronomique pour le Développement (CIRAD, La Réunion, France); Citrus Research International (CRI, Nelspruit, South Africa); Royal Museum for Central Africa (Tervuren, Belgium); Sokoine University of Agriculture (SUA, Morogoro, Tanzania), Stellenbosch University (SU, Stellenbosch, South Africa) and Universidade Eduardo Mondlane (EMU, Maputo, Mozambique).

