EPPO Datasheet: *Bactrocera latifrons*

Last updated: 2021-04-28

IDENTITY

Preferred name: *Bactrocera latifrons*
Authority: (Hendel)
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Diptera: Tephritidae
Other scientific names: *Chaetodacus antennalis* Shiraki, *Chaetodacus latifrons* Hendel, *Dacus latifrons* (Hendel)
Common names: Malaysian fruit fly, solanum fruit fly
view more common names online...
EPPO Categorization: A1 list
view more categorizations online...
EU Categorization: Quarantine pest ((EU) 2019/2072 Annex II A)
EPPO Code: DACULA



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Notes on taxonomy and nomenclature

Bactrocera parvula was considered synonymous of *B. latifrons*, but re-instated as a valid species by Drew & Romig (2013).

HOSTS

Bactrocera latifrons predominantly infests Solanaceae and is considered a major pest of *Capsicum* and *Solanum* species (Drew & Romig, 2013). In addition, it is reported from a various number of other plant families. The USDA Compendium of Fruit Fly Host Information (CoFFHI) (McQuate & Liquido 2016) provides an extensive host list with detailed references.

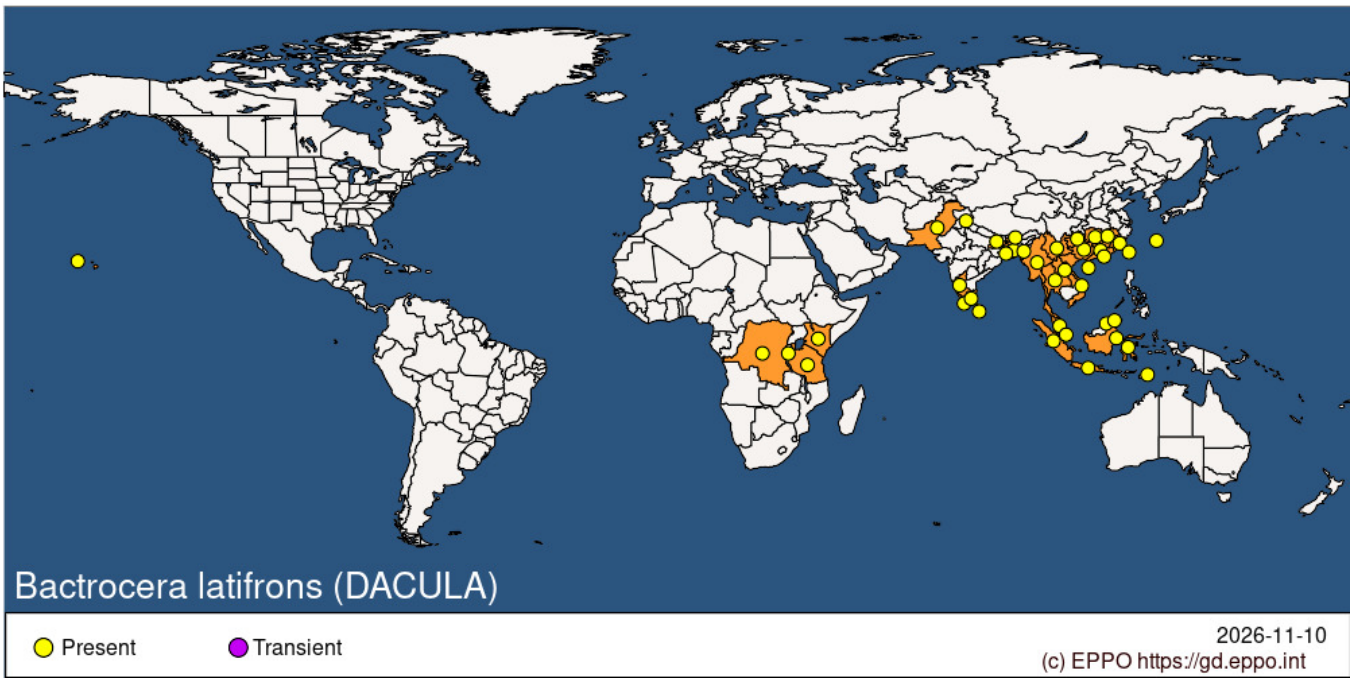
Host list: *Baccaurea motleyana, Benincasa hispida, Capsicum annuum, Capsicum baccatum, Capsicum chinense, Capsicum frutescens, Chionanthus parkinsonii, Citrullus lanatus, Citrus x aurantiifolia, Coccinia grandis, Coffea arabica, Cucumis dipsaceus, Cucumis melo, Cucumis sativus, Diplocyclos palmatus, Gmelina philippensis, Lagenaria siceraria, Lagerstroemia indica, Lycianthes biflora, Lycianthes macrodon, Momordica trifoliolata, Murraya paniculata, Passiflora foetida, Persea americana, Physalis peruviana, Psidium guajava, Punica granatum, Sapindus rarak, Solanum aculeatissimum, Solanum aethiopicum, Solanum americanum, Solanum anguivi, Solanum donianum, Solanum erianthum, Solanum granuloso-leprosum, Solanum incanum, Solanum lanceifolium, Solanum lasiocarpum, Solanum linnaeanum, Solanum lycopersicum, Solanum macrocarpon, Solanum mammosum, Solanum melongena, Solanum nigrescens, Solanum nigrum, Solanum pimpinellifolium, Solanum pseudocapsicum, Solanum scabrum, Solanum sisymbriifolium, Solanum stramoniifolium, Solanum torvum, Solanum trilobatum, Solanum viarum , Solanum violaceum, Solanum virginianum, Syzygium samarangense, Terminalia catappa, Ziziphus jujuba, Ziziphus mauritiana, Ziziphus nummularia*

GEOGRAPHICAL DISTRIBUTION

Bactrocera latifrons is an Asian species widespread from the Indian subcontinent across Southeast Asia (Drew & Romig, 2013). However, because of the re-instatement of *B. parvula* as a distinct species (see Drew & Romig, 2013) the presence in Taiwan needs to be re-assessed. In recent surveys (Doorenweerd *et al.*, 2019), *B. latifrons* was not detected in Taiwan.

B. latifrons was introduced into Hawaii, with a first detection in 1983 (Vargas & Nishida, 1985). It was introduced into Africa, with a first report in Tanzania in 2006 (Mwatawala *et al*., 2007). Records so far show only a limited spread in Africa with records from Burundi, Kenya, and Tanzania. *B. latifrons* was recorded from Yonaguni

(Okinawa Prefecture, Ryukyu Islands) in Japan. Eradication programs were conducted in this area of Japan, and the species was declared eradicated in 2011 (Fukugasako & Okamoto, 2012). However, since 2010 *B. latifrons* has been detected on several of the other Ryukyu Islands and again in Yonaguni in 2018 (Taniguchi *et al.*, 2018).



Africa: Burundi, Congo, The Democratic Republic of the, Kenya, Tanzania, United Republic of
Asia: Bangladesh, Bhutan, Brunei Darussalam, China (Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Xianggang (Hong Kong), Yunnan), East Timor, India (Bihar, Himachal Pradesh, Karnataka, Kerala, Mizoram, Tamil Nadu, West Bengal), Indonesia (Java, Kalimantan, Sulawesi, Sumatra), Japan (Ryukyu Archipelago), Lao People's Democratic Republic, Malaysia (Sabah, West), Myanmar, Pakistan, Singapore, Sri Lanka, Taiwan, Thailand, Vietnam
North America: United States of America (Hawaii)

BIOLOGY

The general life cycle is similar to those of other *Bactrocera* species infesting fruits: eggs are laid below the skin of the host fruit. Three larval stages develop inside the fruit, feeding on the plant tissue. Once mature the third instar larva will leave the fruit, dig down into the soil and turn into a pupa enclosed in a puparium. The adult fly will emerge from the puparium. *Bactrocera latifrons* can complete its life cycle in about 21-24 days (Vargas & Nishida, 1985a; Srikachar *et al.*, 2010), with egg incubation taking about 2-3 days, while larval stage lasts about 8-10 days. Duration of the pupal stage is about 10-14 days. Longevity records vary: Vargas *et al.* (1997) report that adult female longevity can vary between 15 to 80 days depending on the temperature, while Srikachar *et al.* (2010) give an average longevity 131 to 148 days for male and female specimens respectively. Vargas *et al.* (1996) indicate that reproduction is suppressed at 16°C and larval survival rate at that temperature was limited to 2.6%. Takano (2014) showed that an extended period at 8°C kills the majority of the flies (95% mortality after 13 days). Shimizu *et al.* (2007) suggest that *B. latifrons* can overwinter as an adult in areas where winter conditions occur.

DETECTION AND IDENTIFICATION

Symptoms

Attacked fruit have tiny oviposition punctures, but these and other symptoms of damage are often difficult to detect in the early stages of infestation. Considerable damage may occur inside the fruit before symptoms are visible externally, often as networks of tunnels accompanied by rotting.

Morphology

Larva

Fruit fly larvae in general have a typical shape, i.e., cylindrical maggot-shape, elongate, anterior end narrowed and somewhat recurved ventrally, with anterior mouth hooks, and flattened caudal end. Their length varies from 5 to 15 mm. Identification to species level is not possible based on larvae. The 3rd-instar larvae have been described by White & Elson-Harris (1992) and Carroll *et al.* (2004). The former work provides a key to 3rd-instar larvae which is useful for an identification to genus level. in addition, a key to this and other tephritids for the 3rd-instar larvae is available in Balmès & Mouttet (2017) and White & Elson-Harris (1992).

Adult (after diagnostic description given by Drew & Romig, 2013. Additional character states after White, 2006)

Male

Face fulvous with a pair of large oval black spots; postpronotal lobes and notopleura yellow; scutum dull black; lateral postsutural yellow vittae present; medial postsutural yellow vitta absent; no yellow spot anterior to notopleural suture; mesopleural stripe extending to anterior notopleural seta dorsally; scutellum yellow; legs with all segments fulvous except hind tibiae fuscous; femora sometimes with a dark preapical marking; mid tibiae each with an apical black spur; wing with cells bc and c colourless, microtrichia in outer corner of cell c only; a narrow fuscous costal band slightly overlapping R2+3 and expanding into a small spot around apex of R4+5; a medium-width fuscous anal streak; all abdominal terga entirely dark orange-brown; abdominal sterna pale, generally red-brown.

Female

As for male in the general body colour patterns. Pecten absent from abdominal tergum III. Ovipositor basal segment fuscous to black, dorsoventrally compressed and tapering posteriorly in dorsal view; ratio of length of oviscape to length of tergum V, 0.5:1; aculeus apex trilobed.

Remark: a diagnostic protocol for this species has been published by EPPO (2020).

DNA barcoding

DNA barcoding may be used for the molecular identification of *B. latifrons*, however the Barcoding Index Number Systems (BINs) in which this species is represented, also include a few unidentified / possibly misidentified reference sequences. However, at present no DNA barcodes are available for the closely related species *B. parvula.* Sequences are available in the **Barcode of Life Data Systems (BOLD)** and **EPPO-Q-Bank**.

Detection and inspection methods

Male specimens can be attracted by latilure (?-ionol) enhanced with cade oil (McQuate *et al.*, 2004). However, experiments in Tanzania using this lure were not very successful (Mziray *et al*., 2010). In recent years several 3-oxygenated ?-ionone analogs and other related compounds were isolated and shown to act as a stronger attractant than latilure (Nishida & Tan, 2016). Both sexes can be monitored by traps baited with protein-based attractants. Detection is also possible by examination of fruit for oviposition punctures and then rearing the larvae through to the adult stage.

PATHWAYS FOR MOVEMENT

Transport of infested fruits is the main means of movement and dispersal to previously uninfested areas. Adult flight can also result in dispersal but previous citations of long (50-100 km) dispersal movements for *Bactrocera* spp. are unsubstantiated according to a recent review by Hicks *et al.* (2019). Dispersal up to 2 km is considered more typical.

PEST SIGNIFICANCE

Economic impact

Bactrocera latifrons is mainly a pest species of solanaceous crops. While in some places the economic damage appears to be limited (e.g. McQuate *et al.*, 2004), sometimes high infestation rates are recorded. For example, Vijaysegaran & Osman (1991) report 60-80% infestation of chilies in Malaysia.

Control

Management for this species includes the general control measures for *Bactrocera* spp. (see Vargas *et al.* 2015 for an overview of management options). These include sanitation (to gather all fallen and infested host fruits and destroy them). Insecticidal protection is possible by using a cover spray or a bait spray. Bait sprays work on the principle that both male and female tephritids are strongly attracted to a protein source from which ammonia emanates. Bait sprays have the advantage over cover sprays in that they can be applied as a spot treatment so that the flies are attracted to the insecticide and there is minimal impact on natural enemies and other beneficials.

SIT (Sterile Insect Technique) application specifically for this species was used, in combination with other control methods (bait spraying, host plant removal) at Yonaguni Island (Japan) and resulted in eradication (Fukugasako & Okamoto, 2012. But see above under Geographical distribution).

Phytosanitary risk

Bactrocera latifrons is a known pest of several commercial fruit crops in the area where it is present. It can be moved in trade with infested fruit. No detailed study has been made on climatic suitability of the EPPO region for this species; there is only a CLIMEX based predictive model of this species in China (Ma *et al*., 2012). This model indicates that the projected distribution in this country is below 33.442°N. Vargas *et al.* (1996) indicated that *B. latifrons* is adapted to a relative narrower range of temperatures compared to other fruit fly species in Hawaii. This and the reduced larval and adult survival rates at lower temperature (see above, under biology) may give indications that the major part of the EPPO region is largely unsuitable for permanent establishment of *B. latifrons*. However, even transient populations could have impacts on export of host fruit from the EPPO region. The EFSA Panel on Plant Health, in their Pest Categorization of non-EU Tephritidae (EFSA, 2020) placed *B. latifrons* on the list of fruit flies that satisfy the criteria to be regarded as a potential Union quarantine pest for the EU.

PHYTOSANITARY MEASURES

Consignments of fruits from countries or regions where *B. latifrons* occurs should be inspected for symptoms of infestation and those suspected should be cut open in order to look for larvae. Possible measures include that such fruits should come from an area where *B. latifrons* does not occur, or from a place of production found free from the pest by regular inspection in the 3 months before harvest. Plants transported with roots from countries or regions where *B. latifrons* occurs should be free from soil, or the soil should be treated against puparia. The plants should not carry fruits.

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CABI resources used when preparing this datasheet

CABI Datasheet on Pest https://www.cabi.org/isc/datasheet/8719

ACKNOWLEDGEMENTS

This datasheet was prepared in 2021 by Dr M. De Meyer. His valuable contribution is gratefully acknowledged.

How to cite this datasheet?

EPPO (2026) *Bactrocera latifrons*. EPPO datasheets on pests recommended for regulation. Available online. https://gd.eppo.int

Datasheet history

This datasheet was first published online in 2021. It is maintained in an electronic format in the EPPO Global Database. The sections on 'Identity', ‘Hosts’, and 'Geographical distribution' are automatically updated from the database. For other sections, the date of last revision is indicated on the right.



Co-funded by the European Union