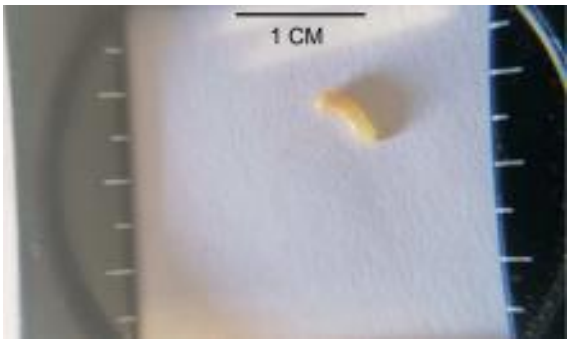
EPPO Datasheet: *Bactrocera zonata*

Last updated: 2021-04-28

IDENTITY

Preferred name: *Bactrocera zonata*
Authority: (Saunders)
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Diptera: Tephritidae
Other scientific names: *Dacus zonatus* (Saunders), *Dasyneura zonata* Saunders, *Rivellia persicae* Bigot, *Strumeta zonata* (Saunders)
Common names: guava fruit fly, peach fruit fly
view more common names online...
EPPO Categorization: A2 list
view more categorizations online...
EU Categorization: Quarantine pest ((EU) 2019/2072 Annex II A)
EPPO Code: DACUZO



more photos...

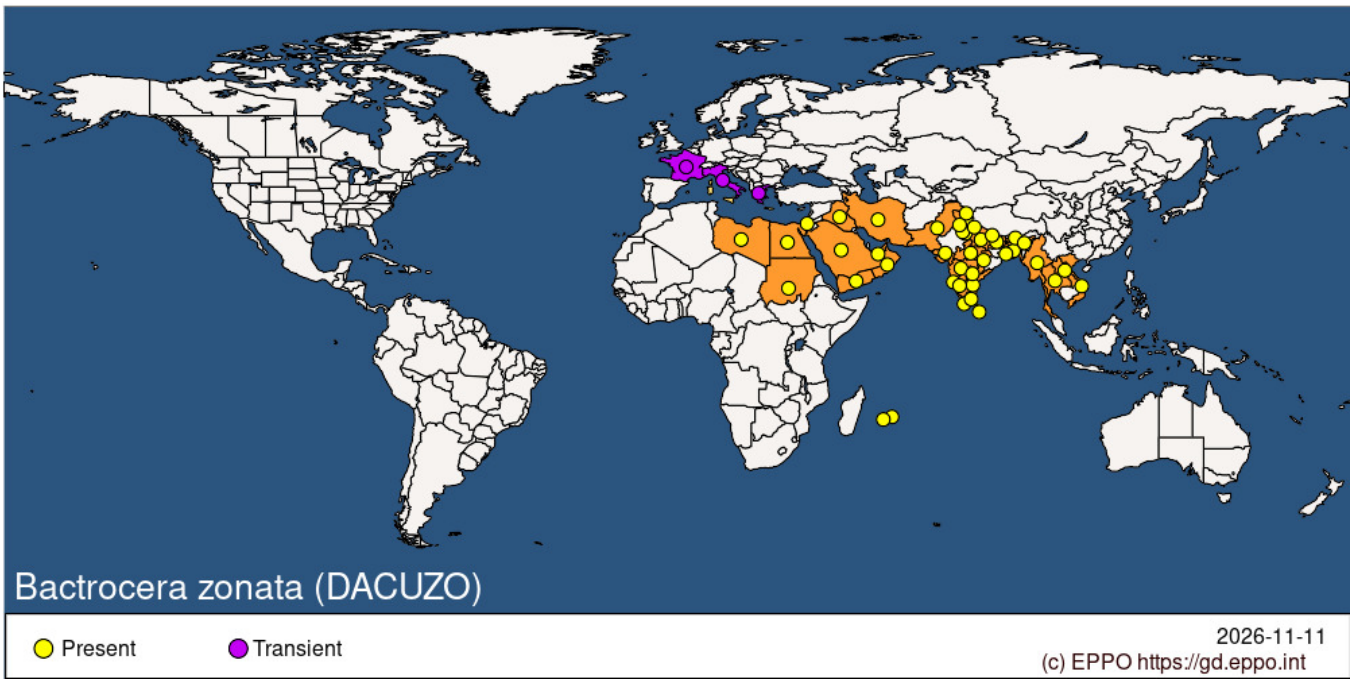
HOSTS

Bactrocera zonata is a polyphagous species reported from a large range of commercial and wild hosts (Allwood *et al.*, 1999). The range of *B. zonata* in Africa, where it was introduced, is much more restricted than in its native area but includes a number of commercially important fruits. The USDA Compendium of Fruit Fly Host Information (CoFFHI) (Culliney *et al.*, 2017) provides an extensive host list with detailed references.

Host list: *Abelmoschus esculentus*, *Aegle marmelos*, *Afzelia xylocarpa*, *Annona reticulata*, *Annona squamosa*, *Careya arborea*, *Carica papaya*, *Citrullus lanatus*, *Citrus reticulata*, *Citrus x aurantium var. paradisi*, *Citrus x aurantium var. sinensis*, *Citrus x aurantium*, *Citrus x limon*, *Coccinia grandis*, *Cucumis sativus*, *Cucurbita sp.*, *Cydonia oblonga*, *Diospyros sp.*, *Elaeocarpus hygrophilus*, *Eriobotrya japonica*, *Ficus carica*, *Grewia asiatica*, *Lagenaria siceraria*, *Luffa acutangula*, *Madhuca longifolia*, *Malpighia emarginata*, *Malus domestica*, *Mangifera indica*, *Manilkara zapota*, *Mimusops elengi*, *Momordica charantia*, *Persea americana*, *Phoenix dactylifera*, *Prunus armeniaca*, *Prunus persica*, *Psidium cattleyanum*, *Psidium guajava*, *Punica granatum*, *Putranjiva roxburghii* , *Pyrus communis*, *Pyrus ussuriensis*, *Syzygium jambos*, *Syzygium samarangense*, *Terminalia catappa*, *Ziziphus jujuba*, *Ziziphus mauritiana*

GEOGRAPHICAL DISTRIBUTION

Bactrocera zonata is an Asian species widespread on the Indian subcontinent and into Southeast Asia. It is also widely distributed in the Middle East (Iran, Iraq) and on the Arabian Peninsula. It was introduced to Africa where it is currently limited to Egypt, Libya and Sudan in the northeast of mainland Africa, as well as on the islands of Mauritius and Reunion in the Western Indian Ocean. The occurrence in Israel is in isolated areas.



EPPO Region: France (mainland), Greece (mainland), Israel, Italy (mainland)
Africa: Egypt, Libya, Mauritius, Reunion, Sudan
Asia: Bangladesh, Bhutan, India (Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu, Telangana, Uttarakhand, Uttar Pradesh, West Bengal), Iran, Islamic Republic of, Iraq, Israel, Lao People's Democratic Republic, Myanmar, Nepal, Oman, Pakistan, Saudi Arabia, Sri Lanka, Thailand, United Arab Emirates, Vietnam, Yemen

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. Based on experiments conducted in La Réunion *Bactrocera zonata* can complete its life cycle in about 61 days at 25°C (Duyck *et al.*, 2007). Females start laying eggs in fruit between 2 and 3 weeks after adult emergence. 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 to be 303 (Duyck *et al.*, 2007). The total duration of the larval stages varies from 4 to 30 days at 35°C and 15°C respectively (Duyck *et al*., 2004). According to Qureshi *et al.* (1993) the immature stages cannot develop at temperatures below 15°C. Once mature the third instar larvae burrow into the soil where they pupate. In areas where winter conditions occur, the winter is passed in the pupal stage according to Rahman et al. (1993). The pupal development takes 8 and 53 days, at 35°C and 15°C respectively (Duyck et al., 2004). Females of *B. zonata* can live for up to 18 weeks.

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. The 3rd-instar larva has been described by Carroll *et al.* (2004). White & Elson-Harris (1992) provide a key to 3rd-instar larvae which is useful for an identification to genus level. A key to this and other tephritids for the 3rd-instar larvae is available in Balmès & Mouttet (2017).

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

Male

Face fulvous with a pair of medium-sized oval black spots; postpronotal lobes and notopleura yellow; scutum red-brown with pale fuscous patterning posteriorly; medium-width parallel-sided lateral postsutural yellow vittae ending at or just behind intra-alar seta; medial postsutural yellow vitta absent; mesopleural stripe reaching to or almost to anterior notopleural seta dorsally; scutellum yellow (except for basal dark margin); legs with all segments entirely fulvous except apices of femora red-brown and hind tibiae pale fuscous to fuscous; wing with cells bc and c colourless, and entirely devoid of microtrichia; a narrow fuscous costal band confluent with R2+3 and ending at apex of this vein, small oval fuscous spots across apex of R4+5; anal streak absent, at most reduced to a pale tint within cell cup; supernumerary lobe of medium development; abdominal terga III-V red-brown with a 'T' pattern consisting of a narrow transverse black band across anterior margin of tergum III (often broken in the central region) and narrow medial longitudinal black band over all three terga (often reduced to a stripe over parts of terga IV and V), narrow anterolateral fuscous corners of terga IV and V, a pair of oval red-brown shining spots on tergum V.

Female

As for male in the general body colour patterns. Supernumerary lobe weak; pecten absent from abdominal tergum III. Ovipositor basal segment red-brown, dorsoventrally compressed and tapering posteriorly in dorsal view; aculeus apex needle shaped.

A diagnostic protocol for this species has been published by EPPO (2013).

DNA barcoding

DNA barcoding may be used for the molecular identification of *B. zonata*, however, it should be noted the Barcoding Index Number Systems (BINs) in which this species is represented, also include a few unidentified / possibly misidentified reference sequences. Sequences are available in the **Barcode of Life Data Systems (BOLD)** and in **EPPO-Q-Bank**.

Detection and inspection methods

Males are attracted to methyl eugenol. Both sexes can be monitored by traps baited with protein-based attractants. An EPPO Standard PM 9/011 (1) *Bactrocera zonata*: procedure for official control includes details on trapping (EPPO, 2010). 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. The natural dispersal ability of *B. zonata* is unclear. Qureshi *et al.* (1975) report records of up to 40 km of spread by individual flies in experiments with sterile males. This seems to be the maximum and possibly a rare occurrence as Hicks *et al.* (2019) recently published a review stating that long distance dispersal (50-100 km) for several *Bactrocera* species is largely based on erroneous citations. Dispersal up to 2 km is considered more typical.

PEST SIGNIFICANCE

Economic impact

B. zonata is polyphagous, but is particularly a pest of peach, mango and guava. The impact of *B. zonata* appears to be variable according to the region and presence or absence of other polyphagous species. In Egypt, losses can be substantial, especially on mangoes, citrus and peaches reaching levels of 20% (Cayol *et al.,* 2002; Saafan *et al.,* 2005). In Pakistan and northern parts of India *B. zonata* is considered more important than *Bactrocera dorsalis* (Qureshi *et al.,* 1991; Kapoor, 1993) causing major losses in peach, apricot, guava and figs; while in Sri Lanka it does not seem to be an important pest (Tsuruta *et al*., 1997). Siddiqui *et al.* (2003) reports damage up to 50% to guava in Pakistan.

In countries where the pest is present, it was reported that *B. zonata* could outcompete other tephritid fruit fly species such as *Ceratitis capitata* (Duyck *et al.*, 2007).

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. Singh & Sharma (2016) report on the positive impact of such an integrated pest management (IPM) program (including ploughing, sanitation, bait sprays and male annihilation technique) against *B. zonata* (together with *B. dorsalis*) on Kinnow Mandarin (*Citrus deliciosa*) in Punjab (India).

Phytosanitary risk

Bactrocera zonata 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. With the isolated occurrences in Israel, *B. zonata* is already present in the EPPO region. EFSA analyzed the distribution models published for *B. zonata* and concluded that several southern parts of the EPPO region, around the Mediterranean are climatically suitable for potential establishment (Baker *et al.*, 2019). Transient populations could also have impacts on export of host fruit from the EPPO region. EFSA compiled a pest report to support the ranking of *Bactrocera zonata* as a priority pest for the EU (Baker et al., 2019).

PHYTOSANITARY MEASURES

Consignments of fruits from countries or regions where *B. zonata* 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. zonata* 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. zonata* occurs should be free from soil, or the soil should be treated against puparia. The plants should not carry fruits.

Procedures for official control aiming to monitor, contain and eradicate *Bactrocera zonata* are described in the EPPO Standard PM 9/011 (1) *Bactrocera zonata*: procedure for official control (EPPO, 2010).

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CABI resources used when preparing this datasheet

CABI Datasheet on Pest https://www.cabi.org/isc/datasheet/17694

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Datasheet history

This datasheet was first published in the EPPO Bulletin in 1983 and revised in the two editions of 'Quarantine Pests for Europe' in 1992 and 1997, as well as in 2005 and 2021. It is now 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.

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