Bactrocera dorsalis (Hendel, 1912)

1. Identity

Preferred Scientific Name: *Bactrocera dorsalis* (Hendel, 1912)

Preferred Common Name: Oriental fruit fly

Other Scientific Names:
Bactrocera (Bactrocera) dorsalis Drew & Hancock, 1994,
Bactrocera (Bactrocera) invadens Drew et al., 2005,
Bactrocera (Bactrocera) papayae Drew & Hancock, 1994
Bactrocera invadens Drew, Tsuruta & White

Figure. 1: Female *Bactrocera dorsalis*

Bactrocera dorsalis is a member of the Oriental fruit fly (*B. dorsalis*) species complex. This species complex forms a group within the subgenus *Bactrocera* and the name may therefore be cited as *Bactrocera dorsalis*. *B. dorsalis* was originally treated as a single species, widespread over Asia, until it was split into several species, with the description of *Bactrocera carambolae*, *B. papayae* and *B. philippinensis* by Drew and Hancock (1994).

Fig. 2: Male *Bactrocera dorsalis*

Bactrocera invadens was later described by Drew et al. (2005), when established populations were detected in East Africa (Lux et al., 2003) and in West Africa (Vayssières, 2004). Extensive research was carried out to delimitate species boundaries, based on morphological, molecular, cytogenetic, behavioural and chemoecological data by multidisciplinary teams. This resulted in the synonymization of *B. invadens* and *B. papayae* under *B. dorsalis* and leaving *B. carambolae* as a distinct species by Schutze et al. (2014), who summarized the extensive research and evidence supporting the synonymization.

Hosts/species affected

With over 300 species of commercial/edible and wild hosts, *B. dorsalis* has the broadest host range of any species of *Bactrocera*. It is a serious pest of a wide range of fruit crops. The major hosts include apple, guava, mango, peach, pear, Cavendish banana, Papaya, Citrus, Peppers, Tomatoes and Cucurbits and many others.

Growth stages affected

- Fruiting stage

- Post-harvest.

Biology and Ecology

The eggs of *B. dorsalis* are laid below the skin of the host fruit. These hatch within a day (although this can be delayed up to 20 days in cool conditions) and the larvae feed for another 6-35 days, depending on the season.
Each female can lay on average 700 eggs depending on the host. Pupariation is in the soil under the host plant for 10-12 days at 25°C and 80% RH, but may be delayed for up to 90 days under cool conditions. The adults occur throughout the year and begin mating after approximately 8-12 days, and may live for 1-3 months, depending on temperature (up to 12 months in cool conditions) (Christenson and Foote, 1960).

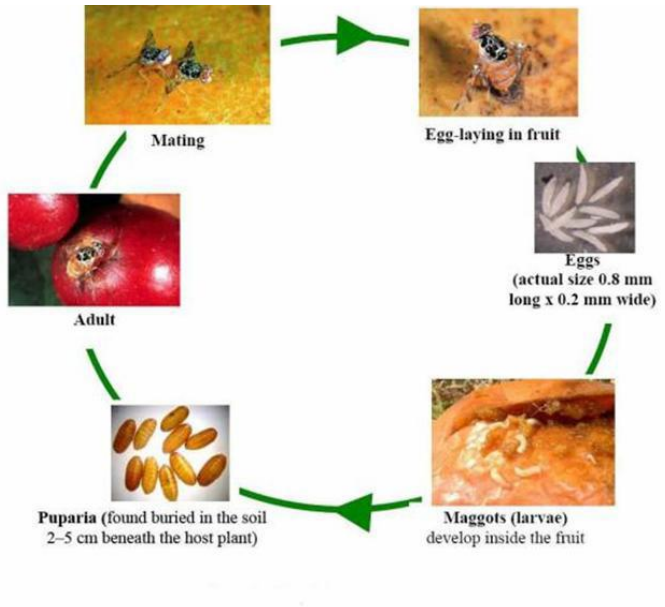

Fig. 3: General life-cycle of fruit flies

Symptoms

Following oviposition there may be some necrosis around the puncture mark ('sting'). This is followed by decomposition of the fruit.

Fig. 4:Female *B. invadens* laying eggs

Fig. 5: Larvae developing infruit pulp causing fruit deterioration

Means of movement and dispersal

Adult flight and the transport of infested fruit are the major means of movement and dispersal to previously un-infested areas. Many *Bactrocera* spp. can fly 50-100 km (Fletcher, 1989).

Movement in trade

Plant parts liable to carry the pest in trade/transport is the fruit (eggs and larvae) and growing medium accompanying plants which carry the pupae.

Impact

B. dorsalis is a very serious pest of a wide variety of fruits and vegetables throughout its range and damage levels can be anything up to 100% of unprotected fruit (CABI, 2016). As a result of its widespread distribution, pest status, invasive ability and potential impact on

market access, *B. dorsalis* is considered to be a major threat to many countries, requiring costly quarantine restrictions and eradication measures.

Phytosanitary significance

Due to the threat posed by *B. dorsalis*, phytosanitary measures are implemented by a number of countries to prevent entry of the pest, thus restricting market access.

Detection and inspection

Fruits (locally grown or samples of fruit imports) should be inspected for puncture marks and any associated necrosis. Suspect fruits should be cut open and checked for larvae. Larval identification is difficult; therefore, they should be reared to adult stage for ease of identification.

Management

Regulatory Control: imports of fruits should only be allowed from areas where *B. dorsalis* does not occur or where routine intensive control measures have been applied. Recommended treatments include fumigation, heat treatment (hot vapour or hot water), cold treatments, insecticidal dipping, or irradiation (Armstrong and Couey, 1989).

Cultural Control and Sanitary Methods:

Removal and destruction of fallen fruits that may harbour larvae by either burning, deep burrying (at least 0.5 m below the surface), or putting the fruits in dark-coloured plastic bags and placing them in the sun (so that the inside temperature rises and kills the larvae).

Another method is disturbing the soil below the fruit trees as this will expose the puparia, leading to desiccation or predation by other organisms.

Another control technique against fruit flies in general is to wrap fruit in a paper bag, or in the case of long/thin fruits, a polythene sleeve. This is a simple physical barrier to oviposition, but it has to be applied well before the fruit is attacked.

Chemical Control: cover sprays of entire crops or the use of bait sprays. A bait spray consists of a suitable insecticide (e.g. malathion, spinosad, fipronil) mixed with a protein bait. Both males and females of fruit flies are attracted to protein sources emanating ammonia, and so insecticides can be applied to just a few spots in an orchard and the flies will be attracted to these spots. The protein most widely used is hydrolysed protein, but some supplies of this are acid hydrolysed and so highly phytotoxic.

Male Suppression: The males of *B. dorsalis* are attracted to methyl eugenol (4-allyl-1,2-dimethoxybenzene), thereby suppressing the reproduction potential. Several traps based on

methyl eugenol are commercially available. Monitoring is also carried out by use of traps baited with methyl eugenol in areas of infestation.

References

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