EPPO Datasheet: *Zeugodacus cucurbitae*

Last updated: 2018-07-27

IDENTITY

Preferred name: *Zeugodacus cucurbitae*
Authority: (Coquillett)
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Diptera: Tephritidae
Other scientific names: *Bactrocera cucurbitae* (Coquillett), *Chaetodacus cucurbitae* (Coquillett), *Dacus aureus* Tseng & Chu, *Dacus cucurbitae* Coquillett, *Dacus yuiliensis* Tseng & Chu, *Strumeta cucurbitae* (Coquillett)
Common names: melon fly, melon 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: DACUCU



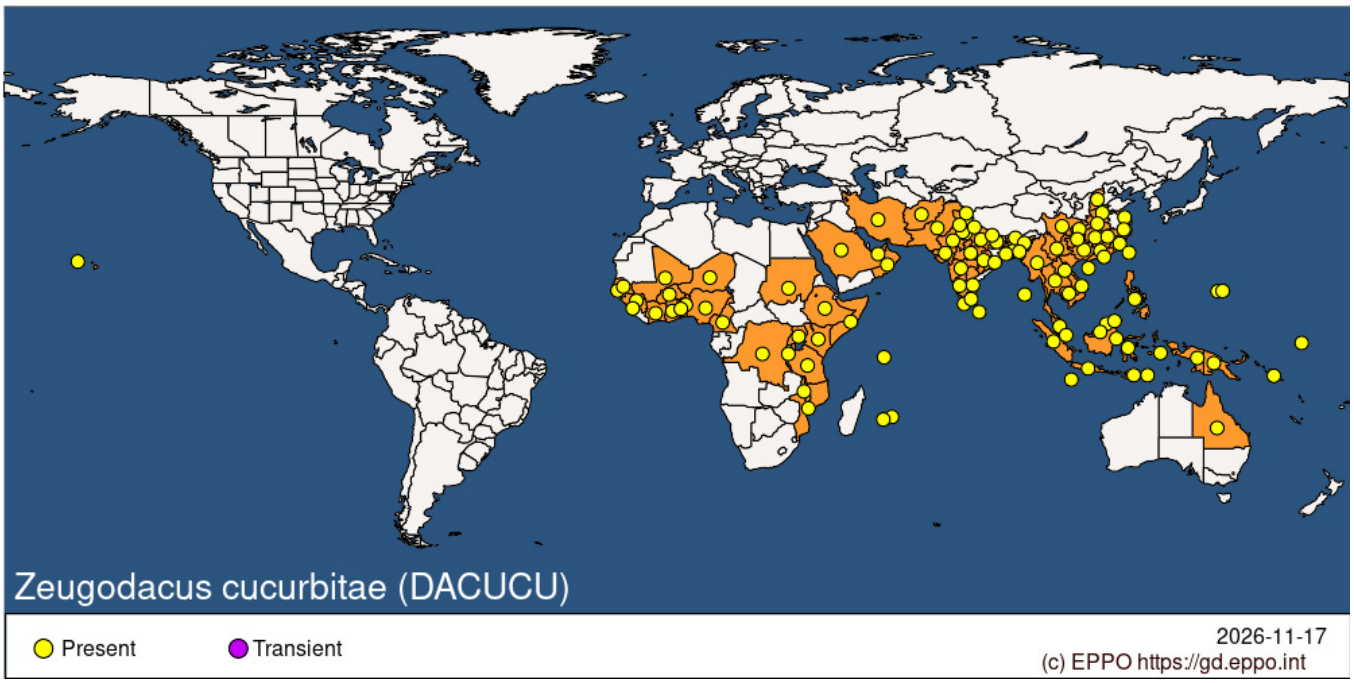
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HOSTS

Recorded almost exclusively on Cucurbitaceae (Weems, 1964), both tropical species (e.g. *Momordica charantia*) and temperate species. In the EPPO region, courgettes (*Cucurbita pepo*), cucumbers (*Cucumis sativus*) and melons (*Cucumis melo*) would be the main potential hosts.

Host list: *Abelmoschus esculentus, Anacardium occidentale, Annona senegalensis, Averrhoa carambola, Benincasa hispida, Capsicum annuum, Capsicum frutescens, Carica papaya, Citrullus colocynthis, Citrullus lanatus, Citrus reticulata, Citrus x aurantium var. sinensis, Coccinia grandis, Coccinia trilobata, Cucumeropsis mannii, Cucumis anguria, Cucumis dipsaceus, Cucumis figarei var. ficifolius, Cucumis melo var. inodorus, Cucumis melo, Cucumis prophetarum, Cucumis sativus, Cucurbita maxima, Cucurbita moschata, Cucurbita pepo, Cucurbita, Cyclanthera pedata, Diplocyclos palmatus, Fabaceae, Kedrostis leloja, Lagenaria siceraria, Lagenaria sphaerica, Luffa acutangula, Luffa aegyptiaca, Mangifera indica, Momordica charantia, Momordica foetida, Momordica rostrata, Momordica trifoliolata, Passiflora edulis, Selenicereus undatus, Sicyos edulis, Solanum aethiopicum, Solanum anguivi, Solanum lycopersicum, Solanum macrocarpon, Solanum nigrum, Strychnos spinosa, Telfairia occidentalis, Trichosanthes cucumerina, Vigna unguiculata, Warburgia ugandensis*

GEOGRAPHICAL DISTRIBUTION



Africa: Benin, Burkina Faso, Burundi, Cameroon, Congo, The Democratic Republic of the, Cote d'Ivoire, Ethiopia, Gambia, Ghana, Guinea, Kenya, Malawi, Mali, Mauritius, Mozambique, Niger, Nigeria, Reunion, Senegal, Seychelles, Sierra Leone, Somalia, Sudan, Tanzania, United Republic of, Togo, Uganda
Asia: Afghanistan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China (Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shanxi, Sichuan, Xianggang (Hong Kong), Yunnan, Zhejiang), Christmas Island, East Timor, India (Andaman and Nicobar Islands, Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh, West Bengal), Indonesia (Irian Jaya, Java, Kalimantan, Maluku, Nusa Tenggara, Sulawesi, Sumatra), Iran, Islamic Republic of, Lao People's Democratic Republic, Malaysia (Sabah, Sarawak, West), Myanmar, Nepal, Oman, Pakistan, Philippines, Saudi Arabia, Singapore, Sri Lanka, Taiwan, Thailand, United Arab Emirates, Vietnam
North America: United States of America (Hawaii)
Oceania: Australia (Queensland), Guam, Nauru, Northern Mariana Islands, Papua New Guinea, Solomon Islands

BIOLOGY

Eggs are laid below the skin of the host fruit. These hatch within 1-3 days and the larvae feed for another 4-7 days at 21°C. Pupariation is in the soil under the host plant and adults emerge after 1-2 weeks (longer in cool conditions) and adults occur throughout the year (Christenson & Foote, 1960). *B. cucurbitae* would be unable to survive the winter in the EPPO region, except possibly in the extreme south. The adults are best able to survive low temperatures, *Bactrocera* spp. generally having a normal torpor threshold of 7°C, dropping as low as 2°C in winter. Sadoshima *et al* . (1990) have shown that strains of *B. cucurbitae* can be selected for cold tolerance, which implies that this might happen in nature. Regression models have been developed in Pakistan to predict population density (Inayatullah *et al* ., 1991a) and levels of fruit infestation (Inayatullah *et al*., 1991b).

DETECTION AND IDENTIFICATION

Symptoms

Attacked fruits will usually show signs of oviposition punctures.

Morphology

Recently, DNA probes have been proposed as a practical means of discriminating between all life stages of the three

main tephritids present in Hawaii (C. capitata, Bactrocera cucurbitae and B. dorsalis) (Haymer et al., 1994).

Larva

Described by Hardy (1949), Menon et al. (1968), Kandybina (1977), Berg (1979), Jabbar Khan & Jabbar Khan (1987), Rohani (1987), Heppner (1989), White & Elson-Harris (1992).

Adult

Colour: Scutum with both lateral and medial yellow vittae; wing with crossvein dm-cu covered by an infuscate area which is separate to other parts of the wing pattern; crossvein r-m usually covered by an infuscate area.

Head: With reduced chaetotaxy, lacking ocellar and postocellar setae; first flagellomere at least three times as long as broad.

Thorax: With reduced chaetotaxy, lacking dorsocentral and katepisternal setae. Postpronotal lobes without any setae (sometimes with some small setulae or hairs); scutum with prescutellar acrostichal setae; scutellum not bilobed, usually with only two marginal setae (the apical pair), but sometimes with four.

Wing: Vein Sc abruptly bent forward at nearly 90°, weakened beyond this bend and ending at subcostal break; vein R1 with dorsal setulae; cell cup very narrow, about half depth of cell bm; cup extension very long, equal or longer than length of vein A1+CuA2; 4-8 mm long; vertical orange-red marking in the apical third.

Abdomen: All tergites separate (view from side to see overlapping sclerites); tergite five with a pair of slightly depressed areas (ceromata). Male with a row of setae (the pecten) on each side of tergite three.

Detection and inspection methods

B. cucurbitae can be monitored by traps baited with male lures. Cue lure (4-(p-acetoxyphenyl)-2-butanone) attracts flies at very low concentrations and is believed to attract over a range of up to 1 km. The lure is usually placed on a cotton-wool wick suspended in the middle of a plastic trap that has small openings at both ends; Drew (1982) describes the Steiner trap. Lure can either be mixed with an insecticide (malathion or dichlorvos) or a piece of paper dipped in dichlorvos can be placed in the trap. Traps are usually placed at a height of about 2 m above ground and should be emptied regularly as it is possible to catch hundreds of flies in a single trap left for just a few days, although the lure may remain effective for at least 2 weeks. A review of the biological aspects of male lures was presented by Cunningham (1989a) and the use of lures is described more fully by Drew (1982). A trapping system used to monitor for possible introductions of B. cucurbitae into New Zealand has been described by Somerfield (1989).

PATHWAYS FOR MOVEMENT

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

PEST SIGNIFICANCE

Economic impact

B. cucurbitae is a very serious pest of the fruits and flowers of cucurbits, and will sometimes attack non-cucurbit hosts. Waterhouse (1993) identifies it as one of the five most important pests of agriculture in South East Asia.

Control

When detected, it is important to gather all fallen and infested host fruits, and destroy them. Liquido (1991) has confirmed that fallen pawpaw fruits are a major sourc of B. cucurbitae in plantations in Hawaii (USA). Fruit infestation can be much reduced by enclosing fruits in paper bags as soon as the flowers have fallen (Fang & Chang,

1987). B. cucurbitae should be continually monitored using bait traps (Bateman, 1982). Insecticidal protection is possible by using a cover spray or a bait spray. Malathion is the usual choice of insecticide for fruit fly control and this is usually combined with protein hydrolysate to form a bait spray (Roessler, 1989); practical details are given by Bateman (1982). 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. Biological control has been tried against B. cucurbitae, but introduced parasitoids have had little impact (Wharton, 1989). The techniques of male annihilation and sterile insect release have been used to eradicate some populations of B. cucurbitae. Male annihilation utilizes the attraction of males to chemical lures (cue lure). The sterile insect technique (SIT) requires the release of millions of sterile flies into the wild population so that there is a strong likelihood of wild females mating with sterile males (Gilmore, 1989). SIT was used to eradicate B. cucurbitae from Kume Island, Japan (Shiga, 1989).

Phytosanitary risk

EPPO lists B. cucurbitae as an A1 quarantine pest (OEPP/EPPO, 1983) within the broad category "non-European Trypetidae"; it is also of quarantine significance to APPPC, COSAVE, CPPC, JUNAC and OIRSA. B. cucurbitae is indigenous to Asia, but like other Bactrocera spp. is known by experience to have the potential to establish adventive populations in various other tropical areas. Its presence in Hawaii, but not in mainland USA, has contributed to its high international profile as a quarantine pest. The direct risk of establishment of B. cucurbitae in most of the EPPO region is minimal, though populations might enter and multiply during the summer months. In southern areas, some populations might survive one or several winters, though in any case the direct losses from such introductions would probably not be high. B. cucurbitae is not considered to present a particular risk to cucurbit crops grown in glasshouses. The major risk for EPPO countries arises from the probable imposition of much stricter phytosanitary restrictions on exported fruits (particularly to America) if Bactrocera spp. enter and multiply, even temporarily.

PHYTOSANITARY MEASURES

Consignments of fruits of *Citrullus, Cucumis* and *Cucurbita* from countries where *B. cucurbitae* occurs should be inspected for symptoms of infestation and those suspected should be cut open in order to look for larvae. EPPO recommends that such fruits should come from an area where *B. cucurbitae* does not occur, or from a place of production found free from the pest by regular inspection for 3 months before harvest. Fruits may also be treated in transit by vapour heat (e.g. keeping at 44.5°C for 8.75 h, USDA, 1994; 46°C for 30 min, Iwata *et al*., 1990) or forced hot-air treatment (Armstrong *et al*., 1995). Ethylene dibromide was previously widely used as a fumigant but is now generally withdrawn because of its carcinogenicity; methyl bromide is less satisfactory, damaging many fruits and reducing their shelf life, but treatment schedules are available (e.g. 32 g/m^3 for 2 h at 21-26°C; USDA, 1994). Wrapping fruits in shrinkwrap film has been investigated as a possible method of disinfesting fruits (Jang, 1990).

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