EPPO Datasheet: *Dacus ciliatus*

Last updated: 2021-04-28

IDENTITY

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Preferred name: *Dacus ciliatus*
Authority: Loew
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Diptera: Tephritidae
Other scientific names: *Dacus apoxanthus decolor* Bezzi, *Dacus brevistylus* Bezzi, *Dacus cocciniae* Premlata & Singh, *Dacus insistens* Curran, *Dacus sexmaculatus* Walker (White & Elson?Harris) (White), *Dacus sigmoides* Coquillett, *Didacus brevistylus* (Bezzi), *Didacus ciliatus* (Loew), *Leptoxyda ciliata* (Loew), *Tridacus malleyi* Munro
Common names: Ethiopian fruit fly, cucurbit fly, lesser melon fly, lesser pumpkin fly
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EPPO Categorization: A2 list
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EU Categorization: A1 Quarantine pest (Annex II A)
EPPO Code: DACUCI

Notes on taxonomy and nomenclature

Dacus ciliatus is placed in the subgenus *Dacus* (*Didacus*) Collart (see White, 2006 for diagnosis of the subgenus). It is a very variable species and easily confused with other, similar species of the same subgenus, in particular *D. frontalis* Becker and *D. vertebratus* Bezzi (White, 2006).

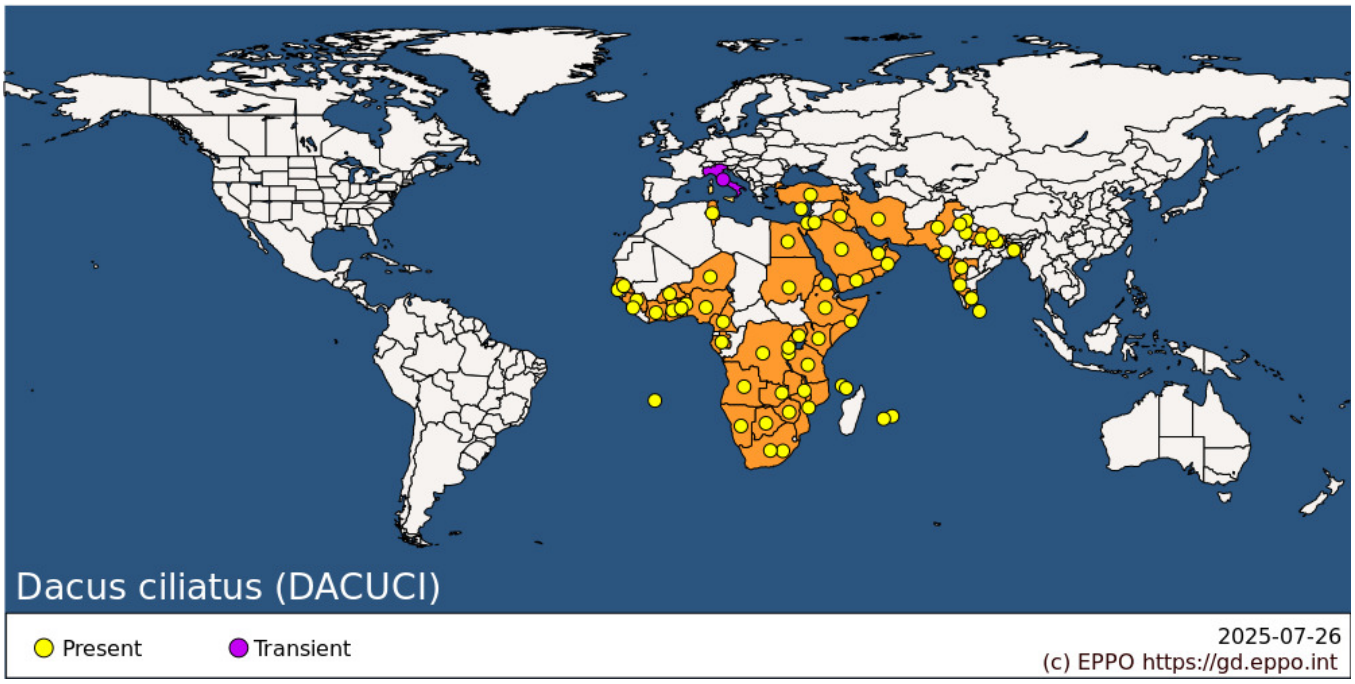
HOSTS

Larvae of *D. ciliatus* develop in the fruits of a wide range of cucurbit crops and wild Cucurbitaceae but is also reported from several other plant families. In the EPPO region, cucumbers, melons and marrows would be the main potential hosts. The USDA Compendium of Fruit Fly Host Information (CoFFHI) (McQuate *et al*., 2018). provides an extensive host list with detailed references.

Host list: *Benincasa fistulosa, Benincasa hispida, Capsicum annuum, Capsicum frutescens, Carica papaya, Citrullus colocynthis, Citrullus lanatus, Citrus reticulata, Citrus sp., Citrus x aurantium var. sinensis, Coccinia adoensis, Coccinia grandis, Coccinia palmata, Coccinia quinqueloba, Coccinia trilobata, Corallocarpus ellipticus, Corallocarpus schimperi, Cucumeropsis mannii, Cucumis aculeatus, Cucumis africanus, Cucumis anguria, Cucumis dipsaceus, Cucumis melo var. flexuosus, Cucumis melo, Cucumis metulifer, Cucumis myriocarpus, Cucumis prophetarum, Cucumis sativus, Cucumis sp., Cucurbita maxima, Cucurbita moschata, Cucurbita pepo, Cucurbita sp., Cyclanthera pedata, Ecballium elaterium, Fragaria vesca, Gossypium sp., Kedrostis foetidissima, Kedrostis leloja, Lagenaria siceraria, Lagenaria sphaerica, Luffa acutangula, Luffa aegyptiaca, Mangifera indica, Momordica balsamina, Momordica charantia, Momordica dioica, Momordica rostrata, Momordica trifoliolata, Passiflora caerulea, Peponium mackenii, Phaseolus sp., Psidium guajava, Sclerocarya birrea, Sechium edule, Solanum aethiopicum, Solanum anguivi, Solanum lycopersicum, Solanum melongena, Solanum pimpinellifolium, Solanum scabrum, Trichosanthes cucumerina, Trichosanthes tricuspidata, Vigna unguiculata*

GEOGRAPHICAL DISTRIBUTION

Dacus ciliatus has a wide distribution throughout Sub-Saharan Africa including drier areas of the Sahelian belt and Southern Africa. Also known from the Middle East and the Indian subcontinent.



EPPO Region: Cyprus, Israel, Italy (mainland), Jordan, Tunisia, Türkiye
Africa: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Comoros, Congo, The Democratic Republic of the, Cote d'Ivoire, Egypt, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Kenya, Lesotho, Malawi, Mauritius, Mayotte, Mozambique, Namibia, Niger, Nigeria, Reunion, Rwanda, Saint Helena, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Tanzania, United Republic of, Togo, Tunisia, Uganda, Zambia, Zimbabwe
Asia: Bangladesh, India (Bihar, Chandigarh, Delhi, Gujarat, Himachal Pradesh, Karnataka, Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh), Iran, Islamic Republic of, Iraq, Israel, Jordan, Nepal, Oman, Pakistan, Saudi Arabia, Sri Lanka, United Arab Emirates, Yemen

BIOLOGY

The general life cycle is similar to those of other *Dacus* species infesting fruits: eggs are deposited inside fruits by the female puncturing the fruit skin. Fruits can be attacked within 10 days of fruit setting and sometimes even before the ovary has been fertilized (Ryckewaert *et al*., 2010). 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. *Dacus ciliatus* can complete its life cycle in 49 to 54 days at 25°C (Vayssieres *et al*., 2008). Females start laying eggs in fruit at 10 to 13 days after adult emergence (Vayssieres et al. 2008). However, El Nahal *et al.* (1971) indicates that this can differ according to the season with, based upon data from Egypt, 5-6 days during summer and up to 30 days in winter. Up to 210 eggs can be laid by a female *D. ciliatus* (El Nahal *et al*., 1971). Eggs are usually white to creamy yellow. The egg incubation period is about 3 days. Larvae are cream coloured. Larval development can take 4-7 days while pupation lasts for 7 – 14 days. Adult longevity can be up to 45 days (El Nahal *et al*., 1971; Patel and Patel, 1998) although Vayssieres *et al.* (2008) report that adults can live for more than 17 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. A partial description of the third larval instar of *D. ciliatus* is given by EPPO (2018). White & Elson-Harris (1992) provides 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) and White & Elson-Harris (1992) but the latter work indicates that *D. ciliatus* larvae cannot be differentiated from those of the closely related *D. frontalis* and *D. vertebratus*.

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

Male

Face fulvous with a pair of small circular black spots; postpronotal lobes yellow or bicoloured (yellow and red-brown); notopleura yellow; scutum predominantly red-brown with blotched patterns due to sites of attachment of dorsoventral flight muscles; lateral and medial postsutural vittae absent; notopleural marking normally wedge shaped and joined to notopleural callus (but can be reduced); broad mesopleural stripe reaching from notopleural callus to (or almost to) katepisternum; extended onto katepisternum; scutellum yellow, without any dark patterning (except for basal dark margin); laterotergal yellow marking confined to katatergite; legs with all segments entirely fulvous, mid tibiae each with an apical black spur; wing with cells bc and c colourless, without an almost complete covering of microtrichia, only in outer corner of cell c; cell bm without microtrichia; remainder of wings colourless except fuscous cell sc; narrow fuscous costal band complete, shallow, not extending below vein R2+3 before wing apex, expanded into a small spot just beyond apex of R4+5; narrow anal streak variable (sometimes confined to within bcu); supernumerary lobe only slightly developed; abdomen oval, predominantly fulvous to red-brown, terga I-V all fused, terga III and IV unmarked, sometimes III and rarely also IV with an isolated sublateral dark spot; tergum III with pecten.

Female

As for male in the general body colour patterns. Legs mid- and hindfemora tending to bicoloured (pale basally, reddish-brown apically; wing, supernumerary lobe weak; pecten absent from abdominal tergum III. Ovipositor basal segment red-brown, dorsoventrally flattened and tapering posteriorly in dorsal view; oviscape length 0.25 times length of tergum V; aculeus apex needle shaped.

Remark: differentiation between this species and closely related species within the subgenus *Dacus* (*Didacus*), in particular *D. frontalis* and *D. vertebratus* can be difficult and needs expert confirmation. See White (2006) and the diagnostic protocol PM 7/138 *Dacus ciliatus* (EPPO,2018) for details on how to differentiate between the main species belonging to this subgenus.

DNA barcoding

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

Detection and inspection methods

Though some *Dacus* spp. can be monitored using traps baited with male lures, *D. ciliatus* is not known to be attracted to any of these. Both sexes can be monitored by traps baited with protein-based attractants (Manrakhan *et al.*, 2017). 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 mean 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. (to which *D. ciliatus* flight capacity was considered similar) are unsubstantiated according to a recent review by Hicks *et al.* (2019). Dispersal up to 2 km is considered more typical. This probably also applies to *D. ciliatus.*

PEST SIGNIFICANCE

Economic impact

Dacus ciliatus can be a serious pest of different cucurbit crops. Comparative studies of infestation by *D. ciliatus* and other cucurbit infesting fruit flies have been published (see Vayssières *et al*., 2008; Mwatawala *et al.*, 2010).

Control

Management for this species includes the general control measures for other fruit flies such as *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. A review on control methods for fruit flies on vegetable crops, including *D ciliatus*, in Réunion is given by Ryckewaert *et al*. (2010). Agroecological management for this and other cucurbit-infesting fruit flies in this area, is discussed in detail by Deguine *et al*. (2015).

Phytosanitary risk

Dacus ciliatus is a known pest of several cucurbit crops in the area where it is present. It can be moved in trade with infested cucurbit fruit. No detailed study has been made on climatic suitability of the EPPO region for this species, and it is unclear whether it could become established in the EPPO region. 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 *D. ciliatus* 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 *D. ciliatus* 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 *D. ciliatus* does not occur, or from a place of production found free from the pest by regular inspection for 3 months before harvest. Plants transported with roots from countries or regions where *D. ciliatus* 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 http://www.cabi.org/isc/datasheet/17682

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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 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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