EPPO Datasheet: *Aleurocanthus woglumi*

Last updated: 2022-06-03

IDENTITY

[more photos...]

Preferred name: *Aleurocanthus woglumi*
Authority: Ashby
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Hemiptera: Sternorrhyncha: Aleyrodidae
Other scientific names: *Aleurocanthus formosana* (Takahashi), *Aleurocanthus punjabensis* Corbett, *Aleurodes woglumi* (Ashby)
Common names: blue grey fly, citrus blackfly, citrus spring whitefly
[view more common names online...]
EPPO Categorization: A1 list
[view more categorizations online...]
EU Categorization: A1 Quarantine pest (Annex II A)
EPPO Code: ALECWO

Notes on taxonomy and nomenclature

Aleurocanthus woglumi is a member of the order Hemiptera, family Aleyrodidae, subfamily Aleyrodinae and tribe Aleurocanthini (David, 1990). *Aleurocanthus husaini* which is closely related to *A. woglumi* was erroneously synonymized with *A. woglumi* before being reinstated as a separate species (Martin and Mound, 2007).

HOSTS

Citrus spp. are the main hosts of *A. woglumi* but it can be found on a wide range of crops, mostly fruit trees, including avocados (*Persea americana*), bananas (*Musa* spp.), cashews (*Anacardium occidentale*), coffee (*Coffea arabica*), ginger (*Zingiber officinale*), grapes (*Vitis* spp.), guavas (*Psidium guajava*), lychees (*Litchi chinensis*), mangoes (*Mangifera indica*), papaws (*Carica papaya*), pears (*Pyrus* spp.), pomegranates (*Punica granatum*), and quinces (*Cydonia oblonga*). In Mexico, 75 species in 38 families have been reported as hosts on which *A. woglumi* can complete its life cycle (Shaw, 1950).

The potential host range in the EPPO region would be essentially citrus, with some possibility of establishment on other woody plantation crops growing in the southern part of the region in climatic conditions suitable for the pest.

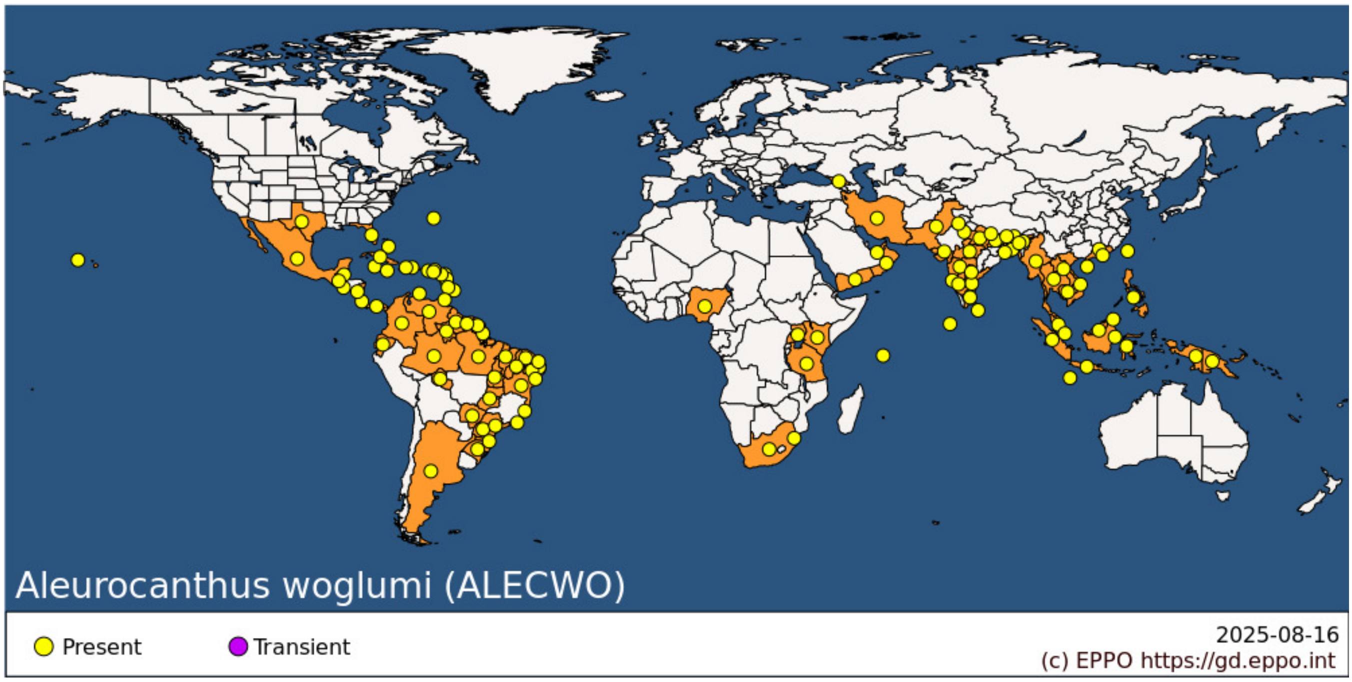
Host list: *Actinidia sp.*, *Anacardium occidentale*, *Annona cherimola*, *Annona muricata*, *Annona sp.*, *Annona squamosa*, *Antigonon leptopus*, *Ardisia compressa*, *Ardisia revoluta*, *Ardisia solanacea*, *Artocarpus altilis*, *Artocarpus heterophyllus*, *Atalantia buxifolia*, *Begonia sp.*, *Bouvardia multiflora*, *Bursera simaruba*, *Buxus sempervirens*, *Byrsonima crassifolia*, *Callerya atropurpurea*, *Canna indica*, *Capparis roxburghii*, *Capparis spinosa*, *Capsicum frutescens*, *Cardiospermum sp.*, *Carica papaya*, *Cedrela sp.*, *Cestrum diurnum*, *Cestrum nocturnum*, *Chrysophyllum cainito*, *Citrus maxima*, *Citrus medica*, *Citrus reticulata*, *Citrus x aurantiifolia*, *Citrus x aurantium var. deliciosa*, *Citrus x aurantium var. paradisi*, *Citrus x aurantium var. sinensis*, *Citrus x aurantium*, *Citrus x latifolia*, *Citrus x limon*, *Citrus x limonia var. jambhiri*, *Clausena lansium*, *Coffea arabica*, *Cordia alba*, *Crataegus sp.*, *Crescentia cujete*, *Croton sp.*, *Cryosophila nana*, *Cupania juglandifolia*, *Cydonia oblonga*, *Diospyros ebenum*, *Diospyros kaki*, *Diospyros sp.*, *Duranta erecta*, *Elaeis guineensis*, *Eugenia uniflora*, *Fortunella sp.*, *Fraxinus sp.*, *Guaiacum officinale*, *Guazuma ulmifolia*, *Gymnosporia diversifolia*, *Hibiscus rosa-sinensis*, *Hibiscus schizopetalus*, *Hibiscus sp.*, *Hura polyandra*, *Inga jinicuil*, *Inga sp.*, *Ixora thwaitesii*, *Jatropha curcas*, *Jatropha urens*, *Lagerstroemia indica*, *Laurus nobilis*, *Loranthus sp.*, *Machilus zuihoensis*, *Madhuca longifolia var. latifolia*, *Magnolia x soulangeana*, *Malpighia glabra*, *Mammea americana*, *Mangifera indica*, *Manilkara zapota*, *Melia azedarach*, *Melicoccus bijugatus*, *Monstera deliciosa*, *Morinda coreia*, *Morus sp.*, *Murraya koenigii*, *Murraya paniculata*, *Musa x paradisiaca*, *Parmentiera edulis*, *Passiflora edulis*, *Persea americana*, *Philodendron sp.*, *Plumeria rubra f. acutifolia*, *Plumeria rubra*, *Populus sp.*, *Pouteria caimito*, *Pouteria campechiana*, *Pouteria sapota*, *Prunus domestica*, *Psidium cattleyanum*, *Psidium guajava*, *Psidium oligospermum*, *Punica granatum*, *Pyracantha koidzumii*

, *Pyrus communis*, *Salacia reticulata*, *Sapindus mukorossi*, *Sapium macrocarpum*, *Scolopia oldhamii*, *Sideroxylon palmeri*, *Solandra guttata*, *Spondias mombin*, *Strelitzia sp.*, *Struthanthus flexicaulis*, *Swinglea glutinosa*, *Syzygium cumini*, *Syzygium jambos*, *Syzygium malaccense*, *Tabebuia riparia*, *Trichilia spondioides*, *Triphasia trifolia*, *Vitis sp.*, *Wallenia laurifolia*, *Washingtonia robusta*, *Zingiber clarkei*

GEOGRAPHICAL DISTRIBUTION

A. woglumi originated in south-east Asia and it has spread widely in tropical and subtropical regions, overlapping the distribution of *A. spiniferus* in some regions. It was first detected in India in 1910, and in 1915 it was reported in other parts of Asia (Vieira *et al*., 2017).

In the Western Hemisphere, *A. woglumi* was first recorded in Jamaica in 1913 and it has spread throughout the Caribbean region into Central America (Hoelmer and Grace, 1989; Vieira *et al*., 2017). By 1940 it had become a serious threat to citrus in Mexico where it may have been introduced on shipments of mango cuttings from India or from boats from Central America (Smith *et al*., 1964). *A. woglumi* was recorded in Florida in 1934, where it is now widespread throughout the north-central and southern parts of the state, and Texas (1955) (Smith *et al*., 1964; Hoelmer and Grace, 1989; Ngugen *et al*., 1998). In Brazil, *A. woglumi* was first detected in 2001, in Belém, Pará state in the north, and has now become widespread in the country (Silva *et al*., 2011; Monteiro *et al*., 2012; Alvim *et al*., 2016). *A. woglumi* was also, discovered near Durban, South Africa in January 1959, and is established in and around Durban on the Natal coast (Bedford and Thomas, 1965).



EPPO Region: Georgia
Africa: Eswatini, Kenya, Nigeria, Seychelles, South Africa, Tanzania, United Republic of, Uganda
Asia: Bangladesh, Bhutan, Cambodia, China (Guangdong, Hainan, Xianggang (Hong Kong)), Christmas Island, India (Andhra Pradesh, Assam, Bihar, Delhi, Goa, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya, Punjab, Sikkim, Tamil Nadu, Telangana, Uttar Pradesh, West Bengal), Indonesia (Irian Jaya, Java, Kalimantan, Sulawesi, Sumatra), Iran, Islamic Republic of, Lao People's Democratic Republic, Malaysia (Sabah, Sarawak, West), Maldives, Myanmar, Nepal, Oman, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, United Arab Emirates, Vietnam, Yemen
North America: Mexico, United States of America (Florida, Hawaii, Texas)
Central America and Caribbean: Antigua and Barbuda, Bahamas, Barbados, Belize, Bermuda, Cayman Islands, Costa Rica, Cuba, Dominica, Dominican Republic, El Salvador, Guadeloupe, Guatemala, Haiti, Jamaica, Netherlands Antilles, Nicaragua, Panama, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Trinidad and Tobago, Virgin Islands (British), Virgin Islands (US)
South America: Argentina, Brazil (Amapa, Amazonas, Bahia, Ceara, Espirito Santo, Goias, Maranhao, Mato Grosso do Sul, Para, Paraiba, Parana, Pernambuco, Piaui, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul,

Rondonia, Roraima, Santa Catarina, Sao Paulo, Sergipe, Tocantins), Colombia, Ecuador, French Guiana, Guyana, Suriname, Venezuela
Oceania: Papua New Guinea

BIOLOGY

In tropical conditions all stages of *A. woglumi* may be found throughout the year, but little breeding occurs during cold periods (EFSA, 2018). Laboratory experiments found that the optimal temperature for development is 25±3?C (Moraes *et al.*, 2014), relative humidity 70-80% (CABI, 2018), and survival was greatest at 25.6?C (Dowell and Fitzpatrick, 1978). *A. woglumi* persists in temperatures often exceeding 44?C in the Middle East or areas such as the Sindh and Punjab provinces in Pakistan and Maharastra in India, where long-term monthly average maximum temperatures can exceed 42?C (Akrivou *et al.*, 2021).

Females opt for oviposition sites in tree canopies with high humidity as this influences egg hatch and nymph survival (Raga *et al.*, 2016; Lima *et al.*, 2017). Each female lays 35-100 or more eggs (average 38) in a spiral pattern on leaf undersides in batches adhered by a short pedicel (Quezada, 1974; Lima *et al.*, 2017), and hatch in 4 to 12 days depending on conditions (Dietz & Zetek, 1920). In the field it has been observed that on sunny days the eggs are laid in the morning, or in the late afternoon, when the relative humidity is highest. On cloudy days, when the relative humidity is almost constant, egg laying may take place at any time during the day (Dietz and Zetek, 1920). Active, first instars (crawlers) emerge. They disperse for a short time (3 or 4 hours) (Medina-Gaud *et al.*, 1991), staying mainly on lower leaf surfaces to avoid strong sunlight and begin feeding on plant sap (CABI, 2018). They then moult, losing their legs and remain attached to the leaf by their mouthparts (Bell *et al.*, 2014). The four instar stages last 7-16, 7-30, 6-20, 16-50 days, respectively (EFSA, 2018), and the adult lifespan is 6 to 12 days (Dietz & Zetek, 1920).

The life cycle generally takes 2-4 months and there are up to six generations annually (CABI, 2018; EFSA, 2018). Hoelmer and Grace (1979) reported three to four generations annually in South Florida, Clausen and Berry (1932) observed five generations each year in Kuala Lumpur, while in the Panama Canal Zone a maximum number of five generations were reported (during the dry season at least one generation is lost) (Dietz and Zetek, 1920).

DETECTION AND IDENTIFICATION

Symptoms

Dense colonies of immature stages develop on the undersides of the leaves, and are more common on the lower half of citrus trees. Direct damage by *A. woglumi* is caused by continuous sucking of leaf sap by both immature and adult stages (Gomes *et al.* 2019). Plants weaken, the leaves wither and drop (Clausen and Berry, 1932), and the fruit-bearing capacity of the tree is also badly affected. The leaf organic nitrogen content is reduced below 2.2%, which is the minimum prerequisite for successful fruit set (Rao and George, 2018). Additional damage is associated with honeydew egestion by nymphs and the development of a sooty mould (*Capnodium* sp.) on leaves and fruits, causing negative physiological changes to plants (Gomes *et al.* 2019; Lima *et al.* 2017) which decrease leaf respiration and photosynthesis (Raga *et al.*, 2013). A heavy infestation gives trees an almost completely black appearance.

Morphology

The genus *Aleurocanthus* has been described based on the puparium. Details for identification are provided in the EPPO Diagnostic Protocol PM 7/007 *Aleurocanthus citriperdus, Aleurocanthus spiniferus* and *Aleurocanthus woglumi* (EPPO, 2022).

Egg

Elongate-oval, 0.2 mm long (CABI, 2018), cream-white to pale yellow at first, turning darker toward advanced stages of maturation (Silva *et al.*, 2015), laid in a very characteristic spiral pattern (Quezada, 1974), attached to the underside of leaves by a short pedicel (CABI, 2018) which is an extension of the chorion fixed to abaxial surface (Raga *et al.*, 2016).

Larval stage

Descriptions of the pre-adult stages are given in PM 7/007 (EPPO, in press).

1st instar (crawler): Elongate-oval, 0.30 mm long x 0.15 mm wide (CABI, 2018), with reddish eye spots, short antennae, and rather short legs (Dietz and Zetek, 1920) with 2 long and several shorter, radiating spiny filaments. Colour rather dark brown under the microscope, almost black on the leaf (Dietz and Zetek, 1920).

2nd instar: Legs are reduced but present, ovate-convex, 0.42-0.45 mm long, dark brown to pale black with yellow markings, with the exception of a large, more or less circular spot on the anterior part of the dorsum, which remains a dull green (Dietz and Zetek, 1920) with easily distinguished, radiating spiny filaments.

3rd instar: More convex and much longer, 0.57-0.65 mm long, generally black with a rounded, greenish spot on the anterior part of the abdomen, spiny filaments obvious (CABI, 2018). Dimorphism is also visible in this stage as the female third instars possess an extra pair of cephalic spines (14) in contrast to male third instars that have only 13 pairs (Dubey and Ko, 2012).

4th instar (puparium or pupal case): Ovate, shiny-black, females about 1.24 mm long, males slightly shorter, up to 1 mm in diameter (CABI, 2018). Submedian spines on the cephalothorax do not reach beyond the margin, except the anterior two pairs. Longitudinal and transverse moulting sutures reach the margin. The eye spots are evident (Dubey and Ko, 2012).

Adult

Females about 1.7 mm in length, males up to 1.35 mm long (Nguyen *et al.*, 1998). At emergence, the head is pale yellow, legs are whitish, and eyes are reddish-brown (Dietz and Zetek, 1920). At rest, the general appearance is metallic grey-blue, being the colour of the wings, which cover most of the body; light markings on the wings appear to form a band across the middle of the red abdomen (CABI, 2018).

Detection and inspection methods

Aleurocanthus woglumi infestations are detected by looking for populations and damage symptoms. Honeydew, sooty mould, and honeydew-seeking ants are general signs of phloem feeding insect infestations (CABI, 2018; Carvalho and Francelli, 2021); they can be used to pinpoint the areas where plants may be inspected for the presence of the pest.

To monitor *A. woglumi*, translucent fluorescent yellow traps are suggested (Meyerdirk *et al.*, 1979; Summy *et al.*, 1986). Furthermore, fluorescent yellow with a reflectance of 500-550 nm proved to be the most attractive shade of yellow (Meyerdirk *et al.*, 1979; Dowell and Cherry 1981). Visual inspections were more efficient than sticky traps for detecting *A. woglumi* at low densities (<5% leaves infested) on citrus trees in urban areas (Dowell and Cherry, 1981; EFSA 2019).

All stages are found on the leaves and several useful taxonomical keys and guides are available in the literature described by Dietz & Zetek (1920), Bink-Moenen (1983), Nguyen *et al.* (1998) & Dubey and Ko (2012). Moreover, a revised EPPO diagnostic protocol is in press. One GenBank accession is available for *A. woglumi* mitochondrial COI gene for cytochrome oxidase subunit I: https://www.ncbi.nlm.nih.gov/nuccore/JX281760.1

PATHWAYS FOR MOVEMENT

Aleurocanthus woglumi is liable to be locally spread by natural dispersal. It can disperse by crawling (first instars), and wind (Dietz & Zetek, 1920; EFSA, 2018) but dispersion will be slow (Hoelmer and Grace, 1989). Specific spread rates for this pest have been reported by Dowel and Fitzpatrick (1978) and Oliveira *et al.* (2001). Adults of *A. woglumi* are capable of limited down-wind flight (up to 187 m in 24 h) (Oliveira *et al.*, 2001) and, according to theoretical estimates, the natural dispersion of the pest can occur between 200 and 300 km annually, mainly along roads (Carvalho and Francelli, 2021). Plants for planting, fruits, vegetables and cut flowers are the main pathways of spread of *A. woglumi* over long distances (Raga *et al.*, 2016; Vieira *et al.*, 2017; EFSA, 2018). The fast spread rates detailed in the literature may be due to river and road transport, especially via the transport of citrus fruits from infested areas to areas where juice production occurs (Vieira *et al.*, 2017). Until April 2022, six records of *A. woglumi* interceptions are listed in the EUROPHYT database on *Citrus* sp., *Citrus hystrix*, *Annona reticulata*, and Musaceae.

PEST SIGNIFICANCE

Economic impact

Aleurocanthus woglumi egests abundant amounts of sugary honeydew, which covers leaf and fruit surfaces, causing foliage drop and making fruits unmarketable. In Mexico and Florida, short-term (less than one-year) infestations were found to reduce fruit production by up to 50%, and longer-term infestations regularly resulted in almost total loss of production. In Pakistan, losses due to citrus blackfly infestations have been estimated at 5 to 10% with occasional losses of 50 to 60% (Hoelmer and Grace, 1989). Severe infestations cause reduction of citrus yield of about 80% (Aruna *et al.*, 2017; Gomes *et al.*, 2019). *Aleurocanthus woglumi* is a constant threat to citrus and other crops in the USA and Venezuela. It has not been recorded as a glasshouse pest (Aruna *et al.*, 2017).

Control

The production and economic losses caused by *A. woglumi* have led to several studies being conducted to identify the most effective strategies for the pest control.

Chemical control of *A. woglumi* is possible but the reduction of pest population is only temporary (Vieira *et al.*, 2017). Several pesticides have been evaluated for the management of *A. woglumi* under field conditions and on nursery citrus (Watts *et al.*, 1973; Ba-Angood, 1977; French and Meagher, 1992; Aruna *et al.*, 2017).

In Texas, organic farmers apply treatments such as sulphur, oils, and microbials to control *A. woglumi* (Thomas, 2007; Vieira *et al.*, 2017). The application of mineral and vegetable oils, or derivatives may result in improved control strategies for agricultural pests and associated diseases and can cause minimal adverse effects on populations of biological agents (Silva *et al.*, 2012; Vieira *et al.*, 2017). Oils from *Eucalyptus globulus, Allium sativum, Gossypium hirsutum, Sesamum indicum, Ricinus communis* are alternative control treatments against *A. woglumi* eggs (90-100% mortality) (Vieira *et al.*, 2017). In Brazil, vegetable oils of *Glycine max*, *Zea mays*, *Helianthus annuus* , *Gossypium hirsutum*, and extract of neem were evaluated on the fourth-instar nymphs and the mortality rate of puparia was above 90% for all vegetable oils (Silva *et al.*, 2012). Also, the methanolic extract of *Mimosa tenuiflora* root bark caused significant mortality of *A. woglumi* nymphs in concentrations above 5 mg/L (Souza *et al.*, 2021). Gamma radiation against citrus blackfly eggs caused egg mortality up to 100% and was recommended as a quarantine treatment (Villavicencio *et al.*, 2009; Vieira *et al.*, 2017).

For biological control, hymenopteran parasitoids such as *Encarsia perplexa* and *Amitus hesperidum* have proved economical and effective; they kept *A. woglumi* below economically damaging levels in much of its distribution range in several parts of the world such as Southern Florida, Trinidad & Tobago, Texas, Mexico, and Dominica (Akrivou *et al.*, 2021). According to Thompson *et al.* (1987) in Florida, both *E. opulenta* and *A. hesperidum* were released and control of *A. woglumi* was mainly due to *E. opulenta*. On Merritt Island (Florida), in addition to the two aforementioned parasitoids a hyperparasite (*Encarsia smithi*) was also released, and although at the beginning of the study *A. hesperidum* was the dominant parasitoid, ultimately *E. opulenta* became and remained dominant until the end of the study. Based on field data obtained by Nguyen *et al.* (1983) *E. smithi* was ineffective when it was released alone, and a delayed reduction of *A. woglumi* populations was observed when *E. smithi* was released together with *A. hesperidum* and *E. opulenta*. It was concluded that the delay was due to activity of *E. smithi* as a hyperparasite of *E. opulenta*. In Southern Texas, *E. opulenta* has held population densities of *A. woglumi* at very low population densities (Summy *et al.*, 1983). As part of a classical biological control programme against *A. woglumi* in Trinidad, *A. hesperidum* parasitoids were released, and citrus blackfly populations declined by more than 98% at all sites while parasitism increased to 60-90% (White *et al.*, 2005). In El Salvador, the introduction of *E. opulenta* brought about the successful biological control of *A. woglumi* (Quezada 1974). Similar results from the release of *E. opulenta* were presented by Dowell *et al.* (1979) in Southern Florida. In Dominica, after four years of the release of *A. hesperidum* and *E. perplexa* it was found that *A. woglumi* populations declined, the parasitoids were present, and no nontarget effects on other Aleyrodidae or their natural enemies were noted (Lopez *et al.*, 2009). In Florida, it has been found that insecticide sprays against other orchard pests can be used without disrupting the parasites of *A. woglumi*, providing the pesticides used are highly water-soluble (Fitzpatrick & Dowell, 1981); this implies that integrated pest management of citrus orchards should be possible.

Finally, control strategies such as the use of silicon forms (e.g. potassium silicate) to induce citrus defence mechanisms with the increased activity of peroxidase and polyphenol oxidase (Vieira *et al.*, 2016; 2017) and the use of *Fusarium volatile* in combination with *Ricinus communis* extract for the control of *A. woglumi* (Barbosa *et al.*, 2021) are promising.

Phytosanitary risk

Aleurocanthus woglumi mainly presents a risk to citrus in Mediterranean countries. It has a well-documented history of spread around the world from its South-East Asian origin.

EFSA (2018) used the Köppen Geiger climate classification system to determine that *A. woglumi* occurs in climatic zones that also occur in European countries, making them potentially suitable for establishment. Furthermore, Akrivou *et al.* (2021) used CLIMEX - a process-oriented climatic niche model - to model the potential global distribution of *A. woglumi* under an historical climate scenario (centred on 1995), including a spatially explicit irrigation scenario and found that there are current and emerging risks in every continent, including a potential invasion in the Mediterranean Basin. Moreover, CLIMEX simulation under the RCP 8.5 climate change scenario for 2050, indicates that the risk of *A. woglumi* establishing in Europe is high, making citrus-growing countries a potential hotspot for *A. woglumi*.

PHYTOSANITARY MEASURES

The import of some host plants of *A. woglumi* for planting from third countries is prohibited (Regulation 2021/2285, Annex VI), while banana (*Musa* spp.) which is a host for *A. woglumi*, is exempt by Regulation 2021/2285, Annex XI, Part C. There are many other hosts that can be imported to the EU with a phytosanitary certificate. A phytosanitary certificate should guarantee absence of the pest from consignments of fruit (EFSA, 2018) although a tolerance for *A. woglumi* may be acceptable during the winter months. It is recommended (EFSA, 2018) that all imported host plants, as planting material and as host cut flowers or branches, should come from a nursery found free from *A. woglumi* during the previous growing season. Planting material and cut flowers or branches of host plants shipped from countries where *A. woglumi* occurs are required to be fumigated (EFSA, 2018).

REFERENCES

Akrivou A, Georgopoulou I, Papachristos DP, Milonas PG & Kriticos DG (2021) Potential global distribution of *Aleurocanthus woglumi* considering climate change and irrigation. *PLoS One* **6**(12) e0261626. https://doi.org/10.1371/journal.pone.0261626

Alvim RG, Aguiar-Menezes E de L & Lima AF de (2016) Dissemination of *Aleurocanthus woglumi* in citrus plants, its natural enemies and new host plants in the state of Rio de Janeiro, Brazil. *Ciência Rural* **46**(11), 1891–1897. https://doi.org/10.1590/0103-8478cr20151101

Aruna J, Jagginavar SB, Karabhantanal S & Huilgol SN (2017) Seasonal Incidence of Citrus Blackfly, *Aleurocanthus woglumi* Ashby and its Natural Enemies on Acid Lime. *Journal of Experimental Zoology*. **20** (Supplement 1), 1519-1523.

Aruna J, Jagginavar SB, Karabhantanal S & Huilgol SN (2017) Survey and management of citrus blackfly, *Aleurocanthus woglumi* Ashby on acid-lime. *Journal of Experimental Zoology* **20** (Supplement 1), 1485-1490.

Ba-Angood SAS (1977) Field trials for the control of *Aleurocanthus woglumi* in the Yemen. *Pans* **23**(2), 149-152.

Barbosa LFS, Santos AC da S, Diniz AG, Alves AL, de Oliveira AFM, da Costa AF & Tiago PV (2021) Entomopathogenicity of fungi in combination with *Ricinus communis* extract for the control of *Aleurocanthus woglumi*. *Entomologia Experimentalis et Applicata* **169**, 838–847.

Bedford ECG & Thomas ED (1965) Biological control of the Citrus Blackfly *Aleurocanthus woglumi* (Ashby) (Homoptera: Aleurodidae) in South Africa. *Journal of the Entomological Society of Southern Africa* **28**(1), 117-132.

Bell H, Wakefield M, Macarthur R, Stein J, Collins D, Hart A, Roques A, Augustin S, Yart A, Péré C, Schrader G, Wendt C, Battisti A, Faccoli M, Marini L & Toffolo EPZ (2014) A Review of the Literature Relevant to the Monitoring of Regulated Plant Health Pests in Europe. Appendix C to the final report on: Plant health surveys for the EU territory: an analysis of data quality and methodologies and the resulting uncertainties for pest risk assessment (PERSEUS) CFP/EFSA/PLH/2010/01. https://doi.org/10.2903/sp.efsa.2014.EN-676

Bink-Moenen RM (1983) Revision of the African Whiteflies (Aleyrodidae), mainly based on a collection from Tchad. *Monografieën van de Nederlandse Entomologische Vereniging* **10**, 1–210.

Clausen CP & Berry PA (1932) The citrus blackfly in Asia and the importation of its natural enemies into tropical America. Technical Bulletin No 320. United States Department of Agriculture, Washington, D.C. pp. 58. PMID: 19988911

David BV (1990) Key to tribes of whiteflies (Aleyrodidae: Homoptera) of India. *Journal of Insect Science* **3**(1), 13-17.

Dietz HF & Zetek J (1920) The blackfly of citrus and other subtropical plants. *USDA Bulletin* **885**, 1-55.

Dowell RV & Fitzpatrick GE (1978) Effects of temperature on the growth and survivorship of the citrus blackfly (Homoptera: Aleyrodidae). *The Canadian Entomologist* **110**(12), 347-1350.

Dowell RV, Fitzpatrick GE & Reinert JA (1979) Biological Control of Citrus Blackfly in Southern Florida. *Environmental Entomology* **8**(6), 595-597.

Dubey AK & Ko CC (2012) Sexual dimorphism among species of *Aleurocanthus* Quaintance & Baker (Hemiptera: Aleyrodidae) in Taiwan, with one new species and an identification key. *Zootaxa* **23**, 1-23.

EFSA Panel on Plant Health (2018) Scientific opinion on the pest categorisation of *Aleurocanthus* spp. *EFSA Journal* **16**(10), 5436.

EPPO (2022) Diagnostic Protocol PM 7/007(2) *Aleurocanthus citriperdus, Aleurocanthus spiniferus* and *Aleurocanthus woglumi. EPPO Bulletin* **52**(3), 346–361.

Fitzpatrick GE & Dowell RV (1981) Survival and emergence of citrus blackfly after exposure to insecticides. *Environmental Entomology* **10**(5), 728-731.

Gomes AMSV, Reis FO, Lemos RNS, Mondego JM, Braun H & Araujo JRG (2019) Physiological characteristics of citrus plants infested with citrus blackfly. *Revista Brasileira de Entomologia* **63**(2), 119-123.

Hoelmer KA & Grace JK (1989) Citrus Blackfly. In: Eradication of Exotic Pests (eds Dahlsten DL, Garcia E). Yale University Press. New Haven, CT. pp 147–165.

Lima BG, Farias P, Ramos EM, Sales TM & Silva AG (2017) Economic injury level of citrus black-fly in commercial ‘Pera-Rio’ orange area. *Revista Brasileira de Fruticultura* **39**(3), e-461.

Lima BMFV, Oliveira RA, Santos EA, Bittencourt MAL & Santos OO (2017) Phytochemical characterization and bioactivity of ethanolic extracts on eggs of citrus blackfly. *Ciência Rural* **47**(11) e20170092

Lopez VF, Kairo MTK, Pollard GV, Pierre C, Commodore N & Dominique D (2009) Post-release survey to assess impact and potential host range expansion by *Amitus hesperidum* and *Encarsia perplexa*, two parasitoids introduced for the biological control of the citrus blackfly, *Aleurocanthus woglumi* in Dominica. *BioControl* **54**(4), 497-503.

Martin JH & Mound LA (2007) An annotated check list of the world’s whiteflies (Insecta: Hemiptera: Aleyrodidae). Magnolia Press. pp 84. ISBN 978-1-86977-112-6 (Online edition).

Medina-Gaud S, Bennett FD & Franqui RA (1969) La mosca negra de los cítricos, *Aleurocanthus Woglumi* Ashby (Homoptera: Aleyrodidae), En Puerto Rico. *The Journal of Agriculture of the University of Puerto Rico* **75**,301-305.

Meyerdirk DE, Hart WG & Burnside JA (1979) Evaluation of a trap for the citrus blackfly, *Aleurocanthus woglumi* (Homoptera: Aleyrodidae). *The Canadian Entomologist* **111**(10), 1127-1129.

Monteiro BS, Rodrigues KCV, Silva AG & Barros R (2012) Ocorrência da mosca-negra-dos-citros (*Aleurocanthus woglumi* Ashby) (Hemiptera: Aleyrodidae) em Pernambuco. *Revista Caatinga* **25**(2), 173-176.

Moraes BC, Souza EB, Ribeiro JBM, Ferreira DBS & Maia WJMS (2014) Impactos das mudanças climáticas na ecoclimatologia de *Aleurocanthus woglumi* Ashby, 1903 (Hemiptera: Aleyrodidae) no Estado do Pará. *Revista Brasileira de Meteorologia* **29**(1), 77–84.

Nguyen Ru, Brazzel R & Poucher C (1983) Population density of the citrus blackfly, *Aleurocanthus woglumi* Ashby (Homoptera: Aleyrodidae), and its parasites in urban Florida in 1979 –1981. *Environmental Entomology* **12**(3), 878–884.

Nguyen R, Hamon AB & Fasulo TR (1998) Citrus blackfly, *Aleurocanthus woglumi* Ashby (Insecta: Hemiptera: Aleyrodidae). Gainesville Florida Department of Agriculture & Consumer Service-Division of Plant Industry. 3: EENY-42.

Oliveira MRV, Silva CCA, Návia D, De Paula SV (2001) A mosca negra dos citros *Aleurocanthus woglumi*. Brasília, DF: Ministério da Agricultura, Pecuária e Abastecimento, (Alerta Quarentenário), pp 12.

Quezada JR (1974) Biological control of *Aleurocanthus woglumi* [Homoptera: Aleyrodidae] in El Salvador. *Entomophaga* **19**(3), 243–254.

Raga A, Felippe N & Imperato R (2016) Population dynamic of citrus blackfly, *Aleurocanthus woglumi* (Hemiptera: Aleyrodidae), in Tahiti Lime in the Eastern of the State of São Paulo, Brazil. *Annual Research & Review in Biology* **11**(1), 1-7.

Rao CN & George A (2018) Pests of Citrus. In: Omkar (eds) Pests and Their Management. Springer, Singapore.

Shaw JG (1950) Hosts of the citrus blackfly in Mexico. *United States Bureau of Entomology and Plant Quarantine* E-793. 3 pp.

Silva AG, Farias PRS, Boiça Junior AL & Souza BHS (2011) Mosca-negra-dos-citros: Características gerais, bioecologia e métodos de controle dessa importante praga quarentenária da citricultura Brasileira. *EntomoBrasilis* **4** (3), 85-91.

Silva JLG, Batista J de L, Silva JG, Brito CH (2012) Use of vegetable oils in the control of the citrus black fly, *Aleurocanthus woglumi* (Hemiptera: Aleyrodidae). *The Revista Colombiana de Entomología* **38**, 182-186.

Silva JDC, Beserra-Junior JEA, Girão-Filho JE, Silva RBQ, Medeiros WR, Carvalho DS & Silva PRR (2015) First report of citrus blackfly (Hemiptera: Aleyrodidae) in the state of Piauí, Brazil. *Brazilian Journal of Biology* **75**(2), 499-500.

Smith HD, Maltby HL & Jimenez EJ (1964) Biological control of the citrus blackfly in Mexico. USDA Technical Bulletin 1964; 1311. pp. 30.

Souza DS, Cruz LS & Pereira RC (2021) Methanolic extract of the root bark of *Mimosa tenuiflora* (Willd.) Poiret to control *Aleurocanthus woglumi* ASHBY (Hemiptera: Aleyrodidae). *Proceedings of 1st International Electronic Conference on Entomology*.

Summy KR, Gilstrap FE, Hart WG, Caballero JM & Saenz I (1983) Biological control of citrus blackfly (Homoptera: Aleyrodidae) in Texas. *Environmental Entomology* **12**, 782–786.

Summy KR, Gilstrap FE & Hart WG (1986) Correlation between flight trap response and foliar densities of citrus blackfly, *Aleurocanthus woglumi* (Homoptera: Aleyrodidae). *The Canadian Entomologist* **118** (2), 81-83.

Thomas DB (2007) Integrated pest management with the sterile insect technique. In: Koul O, Cuperus GW. Ecologically based integrated pest management. 1st ed. CABI, Wallingford (GB), p. 200-1.

Thompson CR, Cornell JA & Sailerl RI (1987) Interactions of parasites and a hyperparasite in biological control of citrus blackfly, *Aleurocanthus woglumi* (Homoptera: Aleyrodidae), in Florida. *Environmental Entomology* **16**(1), 140-144.

Vieira DL, Barbosa VO, Batista JL, Souza WCO, Silva JG, Malaquias JB & Batista JL (2016) Potassium silicate-induced resistance against blackfly in seedlings of *Citrus reticulata. Fruits* **71**(1), 49-55.

Vieira DL, Batista JL, Oliveira R, Malaquias JB & Souza GMM (2017) *Aleurocanthus woglumi* (Hemiptera: Aleyrodidae) in Citrus: Opportunities and Challenges to Implement a Sustainable Management. In: Citrus Pathology, Gill Harsimran and Garg Harsh, IntechOpen,

Villavicencio ALCH, Araújo MM, Fanaro GB, Costa HHSF, Silva PPV, Arthur V & Faria JT (2009) Gamma irradiation as a quarantine treatment against eggs of citrus black fly (*Aleurocanthus woglumi* Ashby). *International Nuclear Atlantic Conference*, Rio de Janeiro, Brazil, ISBN: 978-85-99141-03-8

Watts WS & Alam M (1973) Spray trials against the citrus blackfly (*Aleurocanthus woglumi*) on limes in the Oman. Miscellaneous Report, Overseas Development Administration, Foreign and Commonwealth Office, No. 8:7 pp.

White GL, Kairo MTK & Lopez V (2005) Classical biological control of the citrus blackfly *Aleurocanthus woglumi* by *Amitus hesperidum* in Trinidad. *BioControl* **50**(5), 751–759.

CABI and EFSA resources used when preparing this datasheet

CABI Datasheet on Pest *Aleurocanthus woglumi*. Available from: https://www.cabi.org/isc/datasheet/4137 [accessed on 02 March 2022]

EFSA Pest survey card on *Aleurocanthus spiniferus* and *Aleurocanthus woglumi*. EFSA supporting publication 2019: EN-1565. 17 pp. https://doi.org/10.2903/sp.efsa.2019.EN-1565

ACKNOWLEDGEMENTS

This datasheet was extensively revised in 2022 by Antigoni Akrivou, Benaki Phytopathological Institute (GR). Her valuable contribution is gratefully acknowledged.

How to cite this datasheet?

EPPO (2025) *Aleurocanthus woglumi*. EPPO datasheets on pests recommended for regulation. Available online. https://gd.eppo.int

Datasheet history

This datasheet was first published in the EPPO Bulletin in 1981 and revised in the two editions of 'Quarantine Pests for Europe' in 1992 and 1997, as well as in 2022. 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.

CABI/EPPO (1992/1997) *Quarantine Pests for Europe (1st and 2nd edition)*. CABI, Wallingford (GB).

EPPO (1981) Data sheets on quarantine organisms No. 103, *Aleurocanthus woglumi*. *EPPO Bulletin* **11**(1), 4 pp. https://doi.org/10.1111/j.1365-2338.1981.tb01737.x

Co-funded by the
European Union