**Bemisia tabaci**

**System:** Terrestrial

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Phylum</th>
<th>Class</th>
<th>Order</th>
<th>Family</th>
</tr>
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<tbody>
<tr>
<td>Animalia</td>
<td>Arthropoda</td>
<td>Insecta</td>
<td>Homoptera</td>
<td>Aleyrodidae</td>
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</tbody>
</table>

**Common name**
Weisse Fliege (German), sweet potato whitefly (English), cotton whitefly (English), mosca blanca (English, Dominican Republic)

**Synonym**
- *Aleyrodes tabaci*, Gennadius
- *Aleyrodes inconspicua*, Quaintance
- *Bemisia inconspicua*, Quaintance
- *Bemisia emilieae*, Corbett
- *Bemisia signata*, Bodnar
- *Bemisia bahiana*, Bondar
- *Bemisia costa-limai*, Bondar
- *Bemisia gossypiperda*, Misra and Lamba
- *Bemisia achyrantes*, Singh
- *Bemisia hibisci*, Takahashi
- *Bemisia longispina*, Priesner and Hosny
- *Bemisia gossypiperda*, var. *mosaicivectura* Ghesquiere
- *Bemisia goldingi*, Corbett
- *Bemisia nigeriensis*, Corbett
- *Bemisia rhodesiaensis*, Corbett
- *Bemisia tabaci*, (Gennadius) Takahashi
- *Bemisia manihotis*, Frappa
- *Bemisia vayssierei*, Frappa
- *Bemisia* (Neobemisia) *hibisci*, Visnya
- *Bemisia* (Neobemisia) *rhodesiaensis*, Visnya
- *Bemisia lonicerae*, Takahashi
- *Bemisia minima*, Danzig
- *Bemisia miniscula*, Danzig

**Similar species**
*Trialeurodes vaporariorum*

**Summary**
Bemisia tabaci has been reported from all continents except Antarctica. Over 900 host plants have been recorded for B. tabaci and it reportedly transmits 111 virus species. It is believed that B. tabaci has been spread throughout the world through the transport of plant products that were infested with whiteflies. Once established, B. tabaci quickly spreads and through its feeding habits and the transmission of diseases, it causes destruction to crops around the world. B. tabaci is believed to be a species complex, with a number of recognised biotypes and two described extant cryptic species.

[view this species on IUCN Red List]
Species Description
Eggs, deposited on the underside of leaves, (Note: circular egg deposition for Bemisia is rare) are tiny, oval-shaped, about 0.25mm in diameter and stand vertically on the leaf surface. Newly laid eggs are white then turn brownish. Upon hatching the first instar nymph (0.3mm in length), commonly called the “crawler”, moves about the leaf in search of a place to insert its needle-like mouthparts into the plant to suck up plant phloem. When the crawler finds this site, it molts to the second instar; its legs are pulled up under its body and the rest of the immature stage is sessile. There are three additional nymphal instars (0.4-0.8mm) with the successive stage molting to a slightly larger form. The last nymphal instar develops red eye spots and is commonly called the “red-eyed nymph.” This stage is often incorrectly called the pupal stage; incorrect because insects in this order Hemiptera have incomplete metamorphosis, thus there is no pupa. Throughout the nymphal stages, the body of the whitefly is opaque white in colour and is covered by a waxy exoskeleton. As nymphs feed, they excrete large quantities of liquid waste in the form of honeydew. Honeydew is rich in plant carbohydrates and as whiteflies feed and excrete, this waste is distributed onto plant leaves, flowers and fruit and supports the growth of sooty mould fungus, causing the plant to turn black. Adult whitefly are about 1mm long with two pairs of white wings and light yellow bodies. Their bodies are covered with a waxy powdery material. While whitefly adults can be seen on all plant surfaces, they spend most of their time feeding, mating and ovipositing on the under surfaces of leaves. Males and females are present, typically in even ratios, and mating takes place after an elaborate courtship period. Whiteflies have an interesting biology (called arrhenotoky) in which females can lay eggs that have not been fertilised and these eggs will result in male offspring. Fertilised eggs will result in female offspring. Each female can produce as many as 200 eggs in her lifetime. It takes 30-40 days to develop from egg to adult, depending on the temperature (OISAT, 2004). The EPPO (2004) states that, "Infested plants may exhibit a range of symptoms due to direct feeding damage, contamination with honeydew and associated sooty moulds, whitefly-transmitted viruses and phytotoxic responses. There may be one, or a combination of the following symptoms: chlorotic spotting, vein yellowing, intervein yellowing, leaf yellowing, yellow blotching of leaves, yellow mosaic of leaves, leaf curling, leaf crumpling, leaf vein thickening, leaf enations, leaf cupping, stem twisting, plant stunting, wilting and leaf loss. Phytotoxic responses such as a severe silvering of courgette and melon leaves usually indicate the presence of a Bemisia argentifolii infestation."

Please see PaDIL (Pests and Diseases Image Library) Species Content Page Bugs: Silverleaf whitefly for high quality diagnostic and overview images.

Notes
Considerable research has been done on the taxonomy of Bemisia tabaci, and Perring (2001) proposed 7 distinct groups within the complex. Bemisia tabaci is believed to be a species complex, with a number of recognised biotypes and two described extant cryptic species. Nineteen biotypes have been identified based on non-specific esterase banding patterns (biotypes A-T), and the two described species are Bemisia tabaci and Bemisia argentifolii Bellows and Perring (Bellows et al. 1994). B. argentifolii carries the common name of silverleaf whitefly.
Lifecycle Stages
McAuslane (2000) outlines the life cycle of *Bemisia tabaci* stating that, "*Bemisia tabaci* eggs are oval in shape and somewhat tapered towards the distal end. The egg is pearly white when first laid but darkens over time. At 25 ºC, the eggs will hatch in six to seven days. The first nymphal instar is capable of limited movement and is called the crawler. The dorsal surface of the crawler is convex while the ventral surface, appressed to the leaf surface, is flat. The crawlers usually move only a few centimeters in search of a feeding site but can move to another leaf on the same plant. After they have begun feeding, they will molt to the second nymphal instar, usually two to three days after eclosion from the egg. The second, third and fourth nymphal instars are immobile with atrophied legs and antennae, and small eyes. The nymphs secrete a waxy material at the margins of their body that helps adhere them to the leaf surface. The second and third nymphal instars each last about two to three days. The red-eyed nymphal stage is sometimes called the "pupal stage". There is no molt between the fourth nymphal instar and the red-eyed nymphal stage but there are morphological differences. The fourth and red-eyed nymphal stages combined lasts for five to six days. The stage gets its name from the prominent red eyes that are much larger than the eyes of earlier nymphal instars." Adult females insert their eggs into the foliage of host plants and the newly-hatched nymphs settle for larval life with little movement on the plant chosen by the parent. Winged adults fly about, however, and move between crops (Byrne et al., 1996). Individual females often feed on a variety of different plants, including crops and weeds within crops (Byrne et al. 1990). The species of plants fed upon differ in quality, and while some plant species are best for survival, others are better for egg production (Costa et al. 1991). Adults live for a week or more (Byrne & Bellows 1991) and much of the egg production depends on the food ingested during adulthood."

Habitat Description
The EPPO (2004) states that, "*Bemisia tabaci* are usually detected by close examination of the undersides of leaves, which will reveal adults and/or nymphs. Shaking the plant may disturb the small white adults, which flutter out and quickly resettle. Adults may also be found on sticky traps placed above infested plants."
General Impacts

600 host plants have been cited in, Oliveira et al. (2001). *Bemisia tabaci* possibly originated in India (Fishpool & Burban, 1994) and as a result of widespread dispersal, particularly during the last 15 years, is now distributed nearly worldwide. *B. tabaci* is also a vector of over 100 plant viruses in the genera *Begomovirus* (Geminiviridae), *Crinivirus* (Closteroviridae) and *Carlavirus* or *Ipomovirus* (Potyviridae) (Jones, 2003). Damage is caused not only by direct feeding, but also through transmission of viruses. *Begomoviruses* are the most numerous of the *B. tabaci* transmitted viruses and can cause crop yield losses of between 20% and 100% (Brown & Bird, 1992). The EPPO (2004) states that, "Since the early 1980s, *B. tabaci* has caused escalating problems to both field and protected agricultural crops and ornamental plants. Heavy infestations of *B. tabaci* and *B. argentifolii* may reduce host vigour and growth, cause chlorosis and uneven ripening, and induce physiological disorders. The larvae produce honeydew on which sooty moulds grow, reducing the photosynthetic capabilities of the plant, resulting in defoliation and stunting. *B. tabaci* is known to be a potentially damaging pest of crops such as cotton, brassicas, cucurbits, okra, solanums in the tropics and subtropics (Goolsby et al. 2004). Ellsworth and Martinez-Carrillo (2001) state that, "*B. tabaci*'s small size belies its ability to move relatively large distances locally, placing many hosts within communities at risk of infestation. This ability to disperse is made worse by its extensive movement through commerce of plant products around the globe. The small size and rapid reproductive potential are other characteristics that result in explosive population growth. The damage potential of this pest as a direct plant stressor, virus vector, and quality reducer (e.g., by contamination with excreta) is substantial. These attributes, among others, render this species a shared pest within agricultural communities."

Cassava mosaic disease (CMD) and cassava mosaic geminiviruses (CMGs) are transmitted by the whitefly (Colvin et al. 2004) destroying cassava crops. Cassava (*Manihot esculenta*) is one of the most widely grown staple food crops in sub-Saharan Africa. It is particularly important to the poorest farmers because of its role in food security and as a source of income. Agriculture in tropical and subtropical regions are most threatened, with crops such as beans, cucurbits, peppers, cassavas and tomatoes particularly being affected (Brown, 1994). Tomato yellow leaf curl virus (TYLCV) limits tomato production in several geographic regions, including the Middle East and Far East (Zeidan et al. 1998).

Management Info

Integrated Pest Management: The *Whitefly IPM Project* provides a paradigm for future work on cassava mosaic begemoviruses and whiteflies on cassava in both Africa and elsewhere. Ellsworth and Martinez-Carrillo (2001) offer an extensive integrated management approach. The report details the exact plans and steps that are necessary to adopt and follow through with the integrated pest management guidelines suggested. A summary of the guidelines sketches out the steps to be taken. For details on preventative measures, chemical, physical, cultural and biological control options, please see management information.

Principal source: Diagnostic protocols for regulated pests: *Bemisia tabaci* (EPPO, 2004)
Ellsworth and Martinez-Carrillo, 2001 IPM for *Bemisia tabaci*: a case study from North America.
**FULL ACCOUNT FOR:** *Bemisia tabaci*

**Compiler:** National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

**Review:** Thomas M. Perring, Professor\ Department of Entomology\ University of California USA

**Publication date:** 2005-10-10

### ALIEN RANGE

| [19] UNITED STATES | [1] VANUATU |

### BIBLIOGRAPHY

77 references found for *Bemisia tabaci*

**Management information**


Summary: Discussion about an IPM in the Mediterranean area.


Summary: A European Whitefly Studies Network has been formed to share information about whiteflies and their control.


Bernays, E. A. 1999. When host choice is a problem for a generalist herbivore: experiments with the whitefly, Bemisia tabaci. Ecological Entomology 24:260-267

Summary: Studying investigating the biological control of species.


Summary: Studying investigating the biological control of species.


Summary: Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.


Summary: Report into the success of the IPM used in Arizona for whiteflies.


Summary: Studying investigating the biological control of species.

FFTC (Food and Fertilizer Technology Center). 2002. Biological Characteristics and Forecasting outbreaks of the whitefly, Bemisia tabaci. A vector of diseases in In South Africa.

Summary: Studying investigating the biological control of species.


Summary: Studying investigating the biological control of species.


Summary: Report on management of whitefly in Latin America and the Caribbean.


Summary: Studying investigating the biological control of species.


Summary: An IPM involving whitefly management is currently being developed in Africa.


Summary: Studying investigating the biological control of species.


Summary: Whiteflies in Mexico maybe becoming resistant to the insecticides used.


Summary: Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.


Summary: Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.


Summary: Study into effectiveness of control using different cultivars, cultural practices and chemicals in Sudan.


Summary: Experiment into the best way of using Eretmocerus mundus to control the whitefly.


Summary: Studying investigating the biological control of species.


Summary: Studying investigating the biological control of species.


Summary: Experiment into the effectiveness of Eretmocerus mundus in controlling the whitefly.

**Summary:** Experiments involving using parasites of whitefly native to the Mediterranean and those of an American origin.


**Summary:** This database compiles information on alien species from British Overseas Territories.

Available from: http://www.jncc.gov.uk/page-3680 [Accessed 10 November 2009]

Walker, K. 2006. Silverleaf whitefly (*Bemisia tabaci*) Pest and Diseases Image Library. Updated on 17/05/2006 3:04:01 PM

**Summary:** PaDIL (Pests and Diseases Image Library) is a Commonwealth Government initiative, developed and built by Museum Victoria s Online Publishing Team, with support provided by DAFF (Department of Agriculture, Fisheries and Forestry) and PHA (Plant Health Australia), a non-profit public company. Project partners also include Museum Victoria, the Western Australian Department of Agriculture and the Queensland University of Technology. The aim of the project is: 1) Production of high quality images showing primarily exotic targeted organisms of plant health concern to Australia. 2) Assist with plant health diagnostics in all areas, from initial to high level. 3) Capacity building for diagnostics in plant health, including linkage developments between training and research organisations. 4) Create and use educational tools for training undergraduates/postgraduates. 5) Engender public awareness about plant health concerns in Australia. PaDIL is available from: http://www.padil.gov.au/aboutOverview.aspx, this page is available from: http://www.padil.gov.au/viewPestDiagnosticImages.aspx?id=290 [Accessed 6 October 2006]

**General information**


**ITIS (Integrated Taxonomic Information System), 2004. Online Database *Bemisia tabaci***

**Summary:** An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.


Global Invasive Species Database (GISD) 2015. Species profile Bemisia tabaci.