



Solanum or Pepper whitefly

ALEUROTRACHELUS TRACHOIDES



Figure 1. Solanum whitefly, *Aleurotrachelus trachoides* adults and larvae infesting an outdoor pepper crop (*Capsicum annum*), Turks and Caicos Islands © Chris Malumphy

Background

The Solanum or Pepper whitefly *Aleurotrachelus trachoides* (Back) (Hemiptera: Aleyrodidae) was described from specimens collected on Brazilian nightshade (*Solanum seaphorthianum*) in Cuba and has since been found to occur widely in the Neotropical Region. In recent decades it has significantly increased its geographical distribution due to being spread by man with international trade. It now occurs in the North America, Pacific, West Africa and South East Asia.

Within the UK Overseas Territories *A. trachoides* has recently been found in the British Virgin Islands, Cayman Islands and Turks and Caicos Islands, mostly on pepper (*Capsicum* spp.) and tomato (*Solanum lycopersicon*). It poses a potential economic plant health risk to all the UKOTs with tropical climates.



Figure 2. Close up of *Aleurotrachelus trachoides* adult and a single egg on pepper (*Capsicum annuum*), USA © Vivek Kumar, University of Florida



Figure 3. Close up of *Aleurotrachelus trachoides* puparia on sweet potato (*Ipomoea batatas*) foliage, Gambia; the puparia are black but are usually hidden beneath a layer of cottony white wax © Fera



Figure 4. *Aleurotrachelus trachoides* adults and larvae on an outdoor crop of tomato (*Solanum lycopersicon*) in the Turks and Caicos Islands © Chris Malumphy



Figure 5. Capsicum crop severely damaged by *Aleurotrachelus trachoides*, Martinique © Philippe Ryckewaert – CIRAD, Martinique

Geographical Distribution

Solanum whitefly is native to the Neotropical region but has a history of moving internationally in trade. It was introduced to Tahiti in the 1930s or earlier but has only become widespread in the Pacific over the last 30 years. It was reported from Hawaii (USA) in 1998 (Dawson, 1999) and from Florida (USA) in 1994 (Mead, 1994). It has also been introduced to West Africa (Malumphy, 2005), India and South East Asia.

Nearctic: Mexico; USA (California, Florida, Hawaii, Louisiana, Texas).

Central America and Caribbean: Antigua and Barbuda; Bahamas; Barbados; Belize; British Virgin Islands; Cayman Islands; Costa Rica; Cuba; Dominica; Dominican Republic; El Salvador; Guadeloupe; Guatemala; Haiti; Honduras; Jamaica; Martinique; Netherlands Antilles (Curaçao); Nicaragua; Panama; Puerto Rico; Saint Lucia; Surinam; Trinidad and Tobago; Turks and Caicos Islands; US Virgin Islands.

South America: Brazil; Colombia; Ecuador (Galapagos), French Guiana; Guyana; Peru; Suriname; Venezuela.

Asia: India; also observed in South East Asia although there appear to be no published records.

Africa: Comoros Islands; Gambia; Mozambique; Nigeria; Reunion.

Australasian: Australia; Bonin Islands; Fiji; Guam; Micronesia; French Polynesia; Hawaiian Islands; Nauru and Tonga; Northern Mariana Islands; Palau; Papua New Guinea; Tahiti.

Host Plants

Solanum whitefly is broadly polyphagous, occurring on plants belonging to at least 33 families, and there are nine major crop hosts: celery (*Apium graveolens*); sweet pepper (*Capsicum annuum*); chili pepper (*Capsicum frutescens*); sweet potato (*Ipomoea batatas*); tobacco (*Nicotiana tabacum*); avocado (*Persea americana*); rose (*Rosa* sp.); tomato (*Solanum lycopersicum*); and eggplant (*Solanum melongena*).

Acanthaceae: *Ruellia* sp.

Annonaceae: *Annona cherimolia*; *A. muricata*; *A. reticulata*.

Apiaceae: *Apium graveolens*.

Apocynaceae: *Tabernaemontana divaricata*.

Araceae: *Syngonium podophyllum*; *Xanthosoma sagittifolium*.

Arecaceae: *Chamaedorea elegans*; *Chamaedorea* sp.; *Cocos nucifera*; *Dypsis lutescens*; *Veitchia merrillii*.

Asteraceae: *Bidens pilosa*; *Lactuca sativa*; *Mikania cordifolia*.

Bignoniaceae: *Tabebuia glomerata*; *Tabebuia pallida*.

Boraginaceae: *Cordia collococca*.

Brassicaceae: unspecified.

Cannaceae: *Canna coccinea*.

Casuarinaceae: *Casuarina* sp..

Chrysobalanaceae: *Licania michauxii*.

Convolvulaceae: *Ipomoea batatas*; *Ipomoea* sp.; *Merremia* sp..

Cucurbitaceae: unspecified.

Dioscoreaceae: *Dioscorea* sp.

Fabaceae: *Bauhinia divaricata*; *Canavalia ensiformis*; *Leucaena* sp..

Guttiferae: *Calophyllum antillanum*; *Hypericum hypericoides*.

Lauraceae: *Persea americana*.

Malvaceae: *Hibiscus elatus*.

Melastomataceae: *Miconia magnifolia*.

Moraceae: *Ficus membranaceae*; *Ficus retusa*.

Myrsinaceae: *Ardisia escallonioides*.

Myrtaceae: *Psidium guajava*.

Phytolaccaceae: *Petiveria alliacea*.

Polygonaceae: *Coccoloba uvifera*.

Rosaceae: *Rosa* sp..

Rubiaceae: *Morinda citrifolia*; *Psychotria nervosa*; *Randia aculeate*.

Rutaceae: *Citrus limon*; *Citrus* sp.; *Cleome* sp..

Sapotaceae: *Pouteria sapota*.

Solanaceae: *Capsicum annum*; *C. frutescens*; *Capsicum* sp.; *Cestrum nocturnum*; *Datura stramonium*; *Lycopersicon esculentum*; *Lycopersicon* sp.; *Nicotiana tabacum*; *Solanum melongena*; *S. nigrum*; *S. seaforthianum*; *S. torvum*; *Solanum* sp..

Sterculiaceae: *Theobroma cacao*.

Verbenaceae: *Citharexylum* sp.; *Tectona grandis*.

Description

In life *A. trachoides* adults (Fig. 2) are white, covered with a white powdery wax, and 1-2 mm in length. The puparia (fourth-larval instar) are elliptical, black (Fig. 3), about 1.0 mm in length with a long marginal white wax fringe and they are often covered by the first, second and third-instar exuviae (Fig. 3). The puparia occur in dense colonies that smother the under surfaces of the foliage with puparia, wax secretions and honeydew, on which sooty moulds grow. Although the puparia are black, infestations appear white due to a covering of cottony wax (Figs 1 and 4).

Aleurotrachelus is one of the largest genera of whiteflies and currently contains 74 species (Evans, 2008; Martin & Mound, 2007). There is no comprehensive key for their identification. The black puparia need to be bleached and slide mounted before they can be identified.

Biology

Like all whitefly, the development of *A. trachoides* involves six stages: egg, four larval instars and the adult. Females lay tiny, translucent, oblong eggs on the undersides of leaves (Fig. 2), which turn yellow to greyish-brown as they mature. The life cycle (egg to adult) takes approximately 29 days at 25±1°C; eggs take an average of eight days to hatch, seven days for first instars to moult into second instars, six days for completion of the second instar, four days for the third instar, and four days for the adult to emerge from the fourth instar (puparium) (Kumar *et al.*, 2017).



Figure 6. Pepper plant exhibiting poor growth, chlorosis and leaf curling due to a large infestation of *Solanum* whitefly in the Turks and Caicos Islands © C. Malumphy

Dispersal and Detection

The main natural dispersal stage is the winged adult although they are relatively weak fliers and can only fly over short distances. They readily fly when disturbed and are easily transported by air currents or on workers clothes. Long distance dispersal is by infested plants being moved in plant trade.

Infestations of *A. trachoides* are highly conspicuous due to the cottony wax and are easily detected by examining the lower surfaces of the foliage. Infested plants exhibit chlorosis, poor growth and leaf curling (Fig. 6) and severe infestations can cause significant necrosis and leaf loss (Fig. 5). It is however, very difficult to detect the eggs and early instars during phytosanitary inspections.

Economic Impact

Solanum whitefly feeds on leaves and young shoots, but fruit can also be attacked. Direct damage is caused by larvae and adults feeding and removing large quantities of sap. Symptoms may include plant stunting, leaf loss, and lower fruit production. Indirect damage is caused by sooty moulds developing on honeydew egested by the insect. This may reduce photosynthesis and gas exchange, as well as the aesthetic and economic value of the plants. *Aleurotrachelus trachoides* is not known to be a virus vector.

Aleurotrachelus trachoides is recorded feeding on a wide range of crops and is an economic pest of chillies, peppers, sweet potatoes, tomatoes and yams. It is listed as an A1 quarantine pest by the Regional Plant Protection Organisations of both Southern Africa and Eastern Africa.

Advisory Information

Systemic and contact pesticides may be used to control whitefly depending on the crop and growing conditions. Before using any pesticide the appropriate government body or plant protection service needs to be contacted to check the current regulation. In the literature, several *Encarsia* species (e.g. *E. cubensis*, *E. formosa*, *E. hispida*, *E. nigricephala*, *E. pergandiella*, *E. tabacivora*) are reported to parasitize *A. trachoides*, but there is no data about their potential use as biocontrol agents in practice.

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