Department
for Environment
Food & Rural Affairs

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Tobacco whitefly

Bemisia tabaci

UKOT PLANT PEST FACT SHEET

Figure 1. Tobacco whitefly puparium (left) and adult (right) © Fera

Background

Bemisia tabaci (Gennadius) (Hemiptera: Aleyrodidae) (Fig. 1) is one of the most economically important agricultural and horticultural pests in the World, due in part to its broad polyphagy, prodigious reproductive capacity, adaptability, and ability to vector more than a 110 plant pathogenic viruses. It has many common names including Tobacco whitefly, Silver leaf whitefly and Sweet potato whitefly. It is not a single species but a complex of many morpho-cryptic taxa that are only distinguishable at the molecular level and the taxonomy has not yet been resolved. This is significant as different 'biotypes' or 'species' within the complex vary in biological characteristics such as host preferences, ability to vector viruses and pesticide resistance. Until recently, *B. tabaci* was considered to be a pest of field crops in tropical and sub-tropical regions, but is now widely distributed under glass in temperate areas.

Bemisia tabaci poses a significant economic plant health risk to all the UKOTs. It has the potential to have a highly detrimental impact to vegetable production because of the risk of virus transmission, for example, Tomato yellow leaf curl virus (TYLCV) (Fig. 2) on tomato and Cucurbit yellow stunting disorder virus (CYSDV) (Fig. 3) on melon.

Figure 2 TYLCV symptoms on tomato © D Blancard INRA

Figure 3 CYSDV symptoms on melon © http://www.nacaa.com

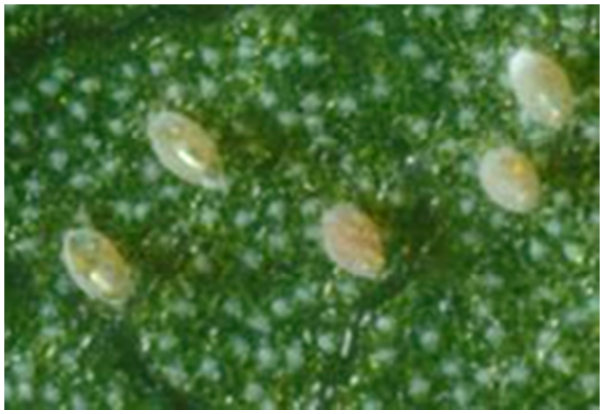

Figure 4 *Bemisia tabaci* eggs © Fera

Figure 5 *Bemisia tabaci* puparium © Fera

Figure 6 *Bemisia tabaci* adult © Fera

Figure 7 Mixed population of whitefly on tomato**:** *Trialeurodes vaporariorum* puparia and one *Bemisia tabaci* puparium (indicated by the arrow) © Fera

Geographical Distribution

Bemisia tabaci is suspected of being native to India but the evidence is inconclusive, and it now occurs worldwide in tropical and subtropical regions, and on indoor or protected plantings in temperate regions (CABI, 2017; Evans, 2008).

Host Plants

Bemisia tabaci feeds on an extremely wide range of host plants (800+ species assigned to 90+ families), and the number of recorded hosts is continually increasing. They include crops grown outside in the tropics and sub-tropics (e.g. cassava, cotton, sweet potatoes, tobacco and tomato), vegetable and salad crops grown under glass in Europe (e.g. cucumber, aubergine, pepper and tomato) and ornamental plants (e.g. poinsettia).

Description

Bemisia tabaci adults (Figs 1 and 6) are about 1 mm long, the male is slightly smaller than the female. The body and both pairs of wings are covered with a white, powdery, waxy secretion. The wings are held tent-like above the body and slightly apart, so that the yellow body is apparent. The eggs (Fig. 4) are oval, pale brown in colour, with a pedicel stalk at the base, approximately 0.2 mm long. They are usually laid randomly, either singly or in scattered small groups, on the under-surface of leaves, although they may be laid in partial circles on smooth leaves, e.g. on *Ficus*. The early larval-instars are yellow-white scales, 0.3-0.6 mm long. The fourth-larval instar (Fig. 1 and 5), known as the puparium or pupa, is oval, narrowing posteriorly, and about 0.7 mm long. On a smooth leaf the puparium lacks enlarged dorsal setae, but if the leaf is hairy or densely covered in whitefly, two to eight long dorsal setae are present. *Bemisia tabaci* is frequently found in association with other whitefly species such as glasshouse whitefly (*Trialeurodes vaporariorum*) (Fig. 7).

Biology

All whiteflies have six developmental stages: egg, four larval instars, and the adult. Each female *B. tabaci* lays up to 160 eggs on the undersides of the leaves. Hatching occurs after 5-9 days at 30°C depending on host species and humidity. The first instar or 'crawler' is flat, oval and scale-like, and is the only mobile larval stage. It moves to a suitable feeding location where it moults and becomes sessile throughout the remaining larval stages. The first three nymphal stages last 2-4 days each whereas the fourth larval stage or puparium lasts for about 6 days, depending on the temperature. The adult emerges through a 'T'-shaped rupture in the pupal case and expands its wings before powdering itself with wax from glands on the abdomen. Mating begins 12-20 hours after emergence and takes place several times throughout the life of the adult. A female may live for 60 days, although the life of the male is generally much shorter, being between 9 to 17 days. Up to 15 generations can occur within one year.

Dispersal and Detection

Adult *B. tabaci* do not fly very efficiently but once airborne, can be transported quite long distances by the wind. All stages of the pest are liable to be carried on planting material and cut flowers of host species. The international trade in poinsettia is considered to have been a major means of dissemination of *B. tabaci* within Europe.

Detecting the eggs and larval instars of *B. tabaci* at low densities can be very difficult due to their small size and cryptic habits. The white waxy adults may be observed on the upper surfaces of foliage or on the growing points. The larvae, particularly the yellow puparia may be observed on the lower surface of the foliage. The adult whitefly can be readily caught on yellow sticky traps and this is the main tool for monitoring outbreaks of *B. tabaci*.

Economic Impact

Bemisia tabaci is one of the most economically important agricultural and horticultural pests in the World. It causes damage directly by feeding and indirectly by honeydew egestion and virus transmission. Feeding by adults and larvae causes chlorotic spotting, growth distortion, and premature leaf drop. The honeydew egested by the feeding larvae covers the surface of the foliage and fruit and serves as a medium for the growth of sooty moulds. This reduces the photosynthetic potential of the infested plant. Honeydew and moulds also disfigure and lower the market value of fruit and flowers. However, it is the viruses vectored by *B. tabaci* that have the greatest economic impact. *Bemisia tabaci* vectors plant viruses in the genera *Geminivirus*, *Begomovirus*, *Closterovirus*, *Nepovirus*, *Carlavirus*, and *Potyvirus*. These can cause total failure of susceptible crops.

Advisory Information

Prevention is always better than cure and the following measures can be taken to reduce the risk of introducing *B. tabaci*:

- Seek assurance from commercial suppliers that plants are free from this pest as part of your commercial contract.
- Thoroughly inspect all new plant material for all stages of the pest when it first arrives at the nursery, particularly on the lower leaves where immature stages are likely to be most visible.
- Keep recently received plants isolated to monitor closely and prevent the spread of any potential infestation.
- Monitor crops throughout the growing season with yellow sticky traps. Check for the presence of whiteflies by agitating plants to encourage flight by adults and inspect the leaves for the immature stages.
- Never mix ornamental and vegetable crops in the same cropping area. It would be difficult to control a *B. tabaci* outbreak in such a situation due to the limited number of insecticides registered for use on glasshouse edibles and the risk of virus spread.

- In high risk crops, preventative release of biological control agents or an application of a systemic insecticide is recommended as soon as plants are brought on to the nursery.
- If any life stages of the pest are detected, begin whitefly treatment programmes immediately to ensure prompt eradication.
- At the end of the season, dispose of remaining plants and thoroughly clean and sterilise the glasshouse area. A complete crop break will help ensure complete eradication of the pest and prevent carry-over into subsequent crops.

References

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Date: 1st February 2017. Version 1.

Acknowledgments: This datasheet was commissioned by the GB Non-Native Species Secretariat (www.nonnativespecies.org) and funded by Department of Environment, Food and Rural Affairs.