Department for Environment Food & Rural Affairs

Plant Pest Factsheet

Tomato Pinworm

Keiferia lycopersicella

Fig. 1. Larva of *Keiferia lycopersicella.* Caterpillars reach a maximum length of 8 mm © James Castner, University of Florida.

Background

The tomato pinworm, *Keiferia lycopersicella* (Lepidoptera, Gelechiidae) is a pest of tomatoes in North America. It causes foliage and fruit damage to crops in the United States, causing damage on up to 80% of fruit in infested fields over the growing season. *Keiferia lycopersicella* has not been intercepted in the UK to date.

Geographical Distribution

Keiferia lycopersicella has been recorded in tropical and subtropical tomato growing regions across North, Central and South America, as well as in the Caribbean and Hawaii. It has been recorded as present in 25 continental US states, though in the northern states and in Ontario, Canada, these records represent outbreaks in glasshouses. *Keiferia lycopersicella* was reported from a tomato crop in Genoa, Italy in November 2008. The outbreak was eradicated and *K. lycopersicella* is no longer considered to be present in Europe

Host Plants

The preferred host is tomato (*Solanum lycopersicum*), on which the caterpillars initially mine the leaves, but may start to eat fruit or stems as the caterpillars mature. Caterpillars will also feed on the leaves of aubergine (*S. melongena*) and potato (*S. tuberosum*). *Keiferia lycopersicella* has also been reported on wild solanaceous plants, with recorded hosts including the hairy tomato (*S. habrochaites*), as well as species found in the UK such as woody nightshade (*S. dulcamara*), and black nightshade (*S. nigrum*).

Description

Keiferia lycopersicella closely resembles other tomato moth pests, most notably *Tuta absoluta,* which it is often found in association with, and precise identification requires examination by a specialist. Oval eggs are laid on leaves, singly or in small clusters, occasionally on the fruits when infestation is heavy. Eggs change colour from pale yellow to orange as they approach hatching. Eggs are less than 0.5 mm long and are unlikely to be seen. Newly hatched caterpillars are a yellow or cream colour with a black or brown head. Older caterpillars reach a maximum length of 8 mm and develop markings that are very variable. The ground colour of the body is usually green, often with darker purple or brown markings sometimes appearing as three vertical stripes down the body. The head is usually pale brown. The prothoracic shield (the segment just behind the head) is also pale brown with a thin black line along the posterior border (lower edge). Adult moths are small, reaching a maximum of 6 mm in length with a wingspan of 9-12mmThe wings have a ground colour of brown or silver, with black speckling. The antennae and legs are brown ringed with black (Fig. 2).

Fig. 2. Adult moth of *Keiferia lycopersicella* in resting position. Side view, showing wing speckling and striped antennae © Mark Dreiling, Bugwood.org

Fig. 3. Small leaf mines on tomato caused by early instar caterpillars of *Keiferia lycopersicella*. © Queen's Printer for Ontario, 2004. Reproduced with permission.

Fig. 4. Pinholes on tomato fruit caused by *Keiferia lycopersicella* caterpillars. © Van Waddill, University of Florida

Fig. 5. Larval *Keiferia lycopersicella* within a silk shelter made within a folded tomato leaf © César Ramos Méndez EPPO global database.

Biology

Each female lays 50-200 eggs, with egg-laying occurring at dusk and continuing during the night when the temperature exceeds 15.5°C. Newly hatched caterpillars spin a silk shelter and begin to feed within the leaf from this shelter, excavating a mine. Initially, the mine is linear (Fig. 3), but as the caterpillars grow older, the mine is enlarged and forms an irregular, reddish blotch, which is highly visible. The frass (excrement) is usually clumped in one spot in the mine and is not left in a linear trail. As they grow, some caterpillars

continue to feed on the leaves, emerging from the mine and creating new shelters from the leaf by folding the leaf and spinning the two sides together (Fig. 5). They may also spin two separate leaves together. However, other caterpillars may move from the mines into the stems or fruit, where they usually burrow inside just underneath the calyx at the top of the fruit – forming characteristic “pinholes” (Fig. 4). Frass is often also observed around the calyx. Silk leaf shelters are not seen in *Tuta absoluta* infestation. Pupation usually takes place just under the surface of the soil but can also occur inside fruit or within the spun folds of leaves. Development from egg to adult moth can take as little as four weeks, with overlapping generations possible in favourable, warm conditions. *Keiferia lycopersicella* can complete its lifecycle in temperatures between 11°C and 35°C. Adult moths are nocturnal, so are unlikely to be seen.

Dispersal and Detection

Long distance dispersal of *Keiferia lycopersicella* is principally by transport within infested fruit. As the entry hole is usually very close to the calyx, infested fruit can be difficult to detect. Additionally, as the caterpillars often leave the fruit or stems to pupate, they can also be transported within packing materials (suspect this is how *Tuta absoluta* was spread so quickly following its arrival in Europe). Young plants for propagation have also been linked to outbreaks in the United States, as eggs and early leaf mines are small and difficult to detect. The distance which adult moths are capable of dispersal by flying is unknown. However, as the nocturnal adults spend the day hidden between leaves and in other enclosed spaces, they may hitchhike on items such as packing crates.

Economic Impact

Most of the damage caused by *Keiferia lycopersicella* on tomato plants is to the leaves through larval feeding, and heavy infestations will severely impact the growth and yield of the plant. Even minor fruit damage will render the fruit unmarketable, and wounds can also be subject to secondary infection. This species is a considerable pest of tomato production in the US and Mexico, and also impacts aubergine production. The UK grew 176 ha of tomatoes commercially in 2023, and this includes many premium crops (e.g., vine tomatoes), where any blemish is unacceptable. This species generally cannot maintain populations with sustained temperatures below 10°C, and so is unlikely to become established in the field in the UK. However, outbreaks in protected cultivation are possible, in these favourable conditions damaging levels of the pest could build up by the production of several overlapping generations.

Pest Management and Reporting

Suspected outbreaks of *Keiferia lycopersicella* or any other non-native plant pest should be reported to the relevant authority:

For **England and Wales**, contact your local **APHA Plant Health and Seeds Inspector** or the **PHSI Headquarters**, York.

Tel: 0300 1000 313

Email: planthealth.info@apha.gov.uk

For **Scotland**, contact the **Scottish Government's Horticulture and Marketing Unit:**

Email: hort.marketing@gov.scot

For **Northern Ireland**, contact the **DAERA Plant Health Inspection Branch:**

Tel: 0300 200 7847 Email: planthealth@daera-ni.gov.uk

Web: https://www.daera-ni.gov.uk/topics/plant-and-tree-health

For additional information on UK Plant Health please see:

https://planthealthportal.defra.gov.uk/pests-and-diseases/uk-plant-health-risk-register/

https://planthealthportal.defra.gov.uk/

https://www.gov.uk/plant-health-controls

http://www.gov.scot/Topics/farmingrural/Agriculture/plant/PlantHealth/PlantDiseases

https://www.daera-ni.gov.uk

Authors

A. Korycinska, D. Eyre and L. Cooper (Defra)

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