European and Mediterranean Plant Protection Organization
Organisation Européenne et Méditerranéenne pour la Protection des Plantes

Data sheets on quarantine pests
Fiches informatives sur les organismes de quarantaine

Tuta absoluta

Identity

Name: *Tuta absoluta* Povolny
Synonyms: *Scrobipalpuloides absoluta* Povolny, *Scrobipalpula absoluta* Povolny, *Gnorimoschema absoluta* Clarke, *Phthorimaea absoluta* Meyrick
Taxonomic position: *Insecta*: *Lepidoptera*: *Gelechiidae*
Common names: tomato borer, South American tomato moth, tomato leaf miner, South American tomato pinworm (English); polilla del tomate, polilla perforadora, cogollero del tomate, gusano minador del tomate, minador de hojas y tallos de la papa (Spanish); traça-do-tomateiro (Portuguese)
Note on taxonomy and nomenclature: *Tuta absoluta* was originally described as *Phthorimaea absoluta* (Meyrick, 1917). The genus was successively changed to *Gnorimoschema* (1962) and *Scrobipalpula* (1964). This species was later placed in a new genus, *Scrobipalpuloides* (in 1987). The correct name of the species is now *Tuta absoluta* (Povolny, 1994)
EPPO code: GNORAB
Phytosanitary categorization: EPPO A1 action list no. 321

Hosts

The main host of *T. absoluta* is tomato, but potato is also reported as a host (CIP, 1996; Galarza, 1984; Notz, 1992), together with *Lycopersicon hirsutum*, *Solanum lyratum* and various wild solanaceous species such as *Solanum nigrum*, *Solanum elaeagnifolium*, *Solanum puberulum*, *Datura stramonium*, *Datura ferox* and *Nicotiana glauca*. In laboratory studies (Galarza, 1984), aubergine was reported as a potential host (with other solanaceous species), but there are no references to its importance in the field. There is an old record of tobacco being attacked in Argentina (Mallea *et al*., 1972).

Geographical distribution

EPPO region: absent
South America: Argentina (introduced from Chile in 1964 according to García & Espul, 1982), Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela. *T. absoluta* is not present in Andean regions at high altitudes (above 1000 m), as low temperatures are a limiting factor for its survival (Notz, 1992)
Asia: Japan (unconfirmed). There is an old record of *T. absoluta* attacking *Solanum lyratum* in Japan (Clarke, 1962) but no recent records
EU: absent

Biology

T. absoluta has a high reproductive potential. Larvae do not enter diapause as long as food is available, and there may be 10–12 generations per year (5 in Argentina). The biological cycle is completed in 29–38 days depending on environmental conditions. Studies in Chile have shown that development takes 76.3 days at 14°C, 39.8 at 19.7°C and 23.8 at 27.1°C (Barrientos *et al*., 1998). Adults are nocturnal and usually hide during the day between leaves. Females lay eggs on aerial parts of their host plants and a single female can lay a total of about 260 eggs during its lifetime. Four larval instars develop. In Argentina, young larvae appear at the end of winter. Pupation may take place in the soil, on the leaf surface or within mines, depending on environmental conditions. When *T. absoluta* does not pupate in the soil, a cocoon is usually built. The pest may overwinter as eggs, pupae or adults.

Detection and identification

Symptoms

After hatching, young larvae penetrate into tomato fruits, leaves or stems on which they feed and develop, thus creating conspicuous mines and galleries. Fruits can be attacked as soon as they are formed, and the galleries bored inside them can be invaded by secondary pathogens leading to fruit rot. On leaves, larvae feed only on mesophyll tissues, leaving the epidermis intact. Leaf mines are irregular and may later become necrotic. Galleries in stems alter the general development of the plants. Tomato plants can be attacked at any developmental stage, from seedlings to mature plants. The pest is generally easily found because it prefers apical buds, flowers or new fruits, on which the black frass is visible. On potato, only aerial parts are attacked, and *T. absoluta* does not develop on tubers (Caffarini *et al*., 1999; Notz, 1992).

Morphology

Egg
Small (0.36 mm long and 0.22 mm large), cylindrical, creamy

white to yellow. Eggs are mainly deposited on the underside of leaves. Hatching takes place after 4–5 days.

Larva
Cream in colour with dark head, becoming greenish to light pink in the second to fourth instars. First instar is 0.9 mm long and fourth is 7.5 mm long. Duration: 13–15 days.

Pupa
Brown. Duration: 9–11 days.

Adult
About 10 mm long, filiform antennae, silverish-grey scales, black spots on anterior wings.

Pathways for movement

T. absoluta can be carried by consignments of plants for planting and fruits of tomato. It does not attack potato tubers and is therefore not likely to enter with consignments of potato. *T. absoluta* is reported as being easily detected.

Pest significance

Economic impact

In Latin America, *T. absoluta* is considered as a key pest of tomato both in the field and under protected conditions. Both yield and fruit quality can be significantly reduced by the direct feeding of the pest and the secondary pathogens which may then enter through the wounds made by the pest. Severely attacked tomato fruits lose their commercial value. 50–100% losses have been reported on tomato (mainly under low rainfall). On potato, CIP (1996) considers that *T. absoluta* is one of the major pests of foliage, occurring in warm zones of low altitudes (below 1000 m).

Control

IPM strategies are being developed in South America to control *T. absoluta*. Studies are being done on the use of synthetic sex pheromones in order to monitor population levels and trigger applications of chemicals (Salas, 2004). Various active substances are effective and can be used in combination with biological control agents. Concerning chemical control, several treatments are required per growing season and it must be noted that a decrease of the efficacy of products used against *T. absoluta* has been observed since the 1980s in tomato crops. Resistance to some insecticides has been reported in several countries, for example to abamectin, cartap and permethrin in Brazil (Siqueira *et al*., 2000). Parasitoids (e.g. *Trichogramma pretiosum*) or predators (e.g. *Podisus nigrispinus*) can be used, and research is being done on biological control (Villas Boas & Franca, 1996; Torres *et al*., 2002). Other control methods include cultural practices (rotation with non-solanaceous crops, ploughing, adequate fertilization, irrigation, destruction of infested plants and of post-harvest plant debris, etc.). Finally, the susceptibility of tomato cultivars to *T. absoluta* varies and plant resistance is being investigated.

Phytosanitary risk

T. absoluta is potentially a serious pest of tomato in the warmer parts of the EPPO region, both in the field and in protected conditions. On potato, the risk appears more limited as *T. absoluta* does not attack tubers in the field or in storage (unlike *Tecia solanivora*). *T. absoluta* has spread from Central America to most of South America, where significant damage is reported. In addition, control may be complicated by the appearance of pest resistance to insecticides.

Phytosanitary measures

T. absoluta was added in 2004 to the EPPO A1 action list of pests recommended for regulation as quarantine pests. Plants for planting and fruits of tomato originating from countries where *T. absoluta* occurs should be free from the pest.

References

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