

Guidelines for the control of *Tuta absoluta* (2016)

The South American Tomato Leaf miner (*Tuta absoluta*) is listed under the EPPO A2 alert list, meaning it is locally present within the EPPO region and is recommended for regulation as a quarantine pest.

This pest was first reported in Malta in April 2009 in the South-West region of Malta. Since then, the distribution of this pest has grown and is now found widely across Malta and Gozo. The infestation level has fluctuated, with low levels observed during the past two years due to control measures taken by growers. However, in 2015, the level of infestation was seen to rise again. This could be due to the development of resistance by the pest to the active ingredients being used.

Host Plants

Tuta absoluta is a harmful leafmining moth with a strong preference for tomato (*Solanum lycopersicum*), but *T. absoluta* can also attack potato (*S.tuberosum*), coloured peppers (*Capsicum annuum*) and other solanaceous plants such as: common thorn apple (*Datura stramonium*), Angel's-trumpets (*D. ferox*), glaucous tobacco (*Nicotiana glauca*), eggplant (*Solanum melongena*), silver-leaf nightshade (*S. elaeagnifolium*), and black nightshade (*S. nigrum*).

Distribution

Originating in South America, the first detection of *Tuta absoluta* was in Spain in 2006. The pest spread rapidly across Southern Europe and North Africa to engulf the whole of the Mediterranean countries. Until today the presence of *Tuta absoluta* has been reported in Italy (including Sardinia), France (including Corsica), Malta, United Kingdom, Greece, Switzerland, Portugal, Morocco, Algeria, Tunisia, Albania, Libya and the Middle East. *Tuta absoluta* was already a serious pest in South America since the 80's.

Biology

With a lifecycle ranging from 29 to 38 days, depending on the temperature, *Tuta absoluta* can reproduce very rapidly. The caterpillars do not enter diapause as long as food is available. One female may lay up to 260 eggs during her life, which are deposited on the aboveground parts of the plant. The caterpillar lives as a miner in the leaf, stem or fruit but

usually exits the mine to pupate. Larger caterpillars can sometimes be found outside the mine or fruit. Pupation may take place in the soil as well as on the surface of a leaf, in a curled-up leaf or in a mine. The species can overwinter as egg, pupa or adult. The moths are active during the night and hide between the leaves at daytime.

Pathways of introduction

The two main pathways for introduction of the pest is by larva- infected seedlings, from plant and debris including fruits, left nearby, and through the trade of infected fruits for market. The larva can remain alive in this plant material and re-infect the newly planted crop when the conditions are right.

Other wild hosts which are of the family *Solanacea* can also harbor the pest.

Identification

The moth has a grey-brown colour, is approximately 6 mm in size and has a wingspan of about 10 mm.



Source: <http://www.uniprot.org/taxonomy/702717>



<http://biochemtech.net/eng/traps/vegetable-pests/tomatnaya-miniruyuschaya-mol-tuta-absoluta/>

Newly-hatched caterpillars are approximately 0.5 mm in size and have a yellowish colour. When maturing, caterpillars turn yellow-green and a black band develops behind the head. Fully grown caterpillars are approximately 9mm in size with a pinkish colour on the back. The pupa is light brown and approximately 6mm in size.



Source: M. van der Straten, National Reference Laboratory,
Plant Protection Service, The Netherlands, April 2009

<http://www.tutaabsoluta.com/tuta-absoluta>

Damage patterns and detection

All aboveground parts of the plant in each developmental stage can be infested by *Tuta absoluta*. Under greenhouse conditions its continuous development results in the presence of all stages of *Tuta absoluta* throughout the entire growing season. The caterpillars have a strong preference for leaves and stems but they may also be found in or under the crown of the fruit and in the fruit itself; small heaps of excrements are often found near the entrance hole. The most distinctive symptoms of the presence of the species are the blotch-shaped mines in the leaves in which the caterpillars can be found. In case of a serious infestation leaves die off completely, while mining damage to the stems causes malformation of the plant. Damage to the fruit may give easy access to diseases, causing decay of the fruit.



Source:

<http://www.tomatoville.com/showthread.php?t=22081>

<http://www.agripest.net/gallery/tuta-absoluta/65>

Control Measures

Introduction of *Tuta absoluta* may likely be by way of infected plants for planting, since plants can carry all stages of the pest. An outbreak can occur in a greenhouse or field where tomatoes and other solanaceous crops (such as potatoes or aubergines) have been grown previously and which also support the development of the pest.

In Malta, *Tuta absoluta* is now well established and complete eradication is impossible. However, it may be controlled by various measures, some of which involve cultural practices such as Integrated Pest Management (IPM) and others include the use of chemicals and other synthetic products such as pheromones.

- ***Monitoring with lures and Mass trapping***

The use of pheromone traps can be used both to give an early warning of the presence of the pest and also to monitor the infestation density of the pest. It can also help to reduce the population when used for mass trapping, in which case a higher number of traps need to be placed for higher captures. It should be used in conjunction with other measures to achieve a lower level of damage and to reduce the reliance on insecticide treatment. Mass trapping is an option both for open field production and for greenhouse production, however for practical reasons will achieve a higher success rate when used in protected cultivation.

For monitoring purposes, the number of traps placed should be 2-4 traps per hectare. For mass trapping, the number of traps placed should be 2-3 per tumolo for greenhouses and 4-5 traps per tumolo for open fields. In both cases, the traps should be placed 25 metres apart.

- ***Use of physical protection in greenhouses***

Greenhouses should be fitted with insect exclusion nets throughout and all doors capable of being sealed tightly. Any openings or gaps in the structure should be avoided.

Human traffic from infested to non-infested greenhouses should be avoided and growers should make sure that live adult moths are not present on their person before entering greenhouses. Soil infested with pupa may also be carried from one place to another.

- ***Chemical control***

Chemical control has been the main control measure used since the pest was reported. Unfortunately, as is often the case, frequent and intense application of insecticide leads to resistance by the pest. To avoid this, insecticides should not be used early in the cropping season and definitely not when signs of *Tuta absoluta* are absent. Low infestations should be controlled with the minimal application frequency possible of chemical insecticides.

When chemical insecticides are to be used for the control of an infestation, different active ingredients should be used alternately and not mixed together all at once, otherwise this will allow the pest to build up resistance in a shorter span of time. The following active ingredients are suggested for the control of *Tuta absoluta*:

Imidacloprid
Indoxacarb
Spinosad
Deltamethrine (against adult moths)
Rynaxypyr

- ***Non-chemical control***

The use of Neem oil (Azadiractin) acts as a contact and systemic insecticide against low infestations of *Tuta absoluta* larva when used on the tomato plant. The use of *Bacillus thuringensis* is recommended at low-medium infestation levels in conjunction with Azadiractin.

The application of dustable sulphur (kubrit) can also have a repellent effect on oviposition, and therefore should be used as a non-chemical preventive measure.

The use of a UV insect attractant in the greenhouse is recommended to attract adult moths, as is the use of yellow sticky traps.

- ***Good Agricultural Practices and Integrated Pest Management (IPM)***

Good Agricultural Practices and Integrated pest management should always be part of a growers' practice for all types of pests and crops. Good agricultural practices for the control of *Tuta absoluta* include crop rotation with non-solanaceous crops (preferably Cruciferous crops), ploughing, adequate irrigation and fertilisation, removal of infested plants and complete removal of post-harvest plant debris and fruit. The removal of wild solanaceous host plants in the vicinity of the growing area is also encouraged, as these can host all stages of the pest which can then re-infect the growing crop.

Keeping a good planting distance between rows is advised, not having crowding of plants, as is removal of weeds and keeping the area clean from fascicle (farrina) residues.

All tomato seedlings originating from Nurseries, whether local or foreign, should not show any signs or symptoms of *Tuta absoluta* and must be accompanied by a plant passport, which should be kept on the premises and produced when requested by Plant Health officials during inspections.

Following the greenhouse growing season, all plants should be cut from above the soil level and left to dry out inside the greenhouse. Insecticide should continue to be applied in order to completely kill off adult moths before transferring debris outdoors for burning, which should be carried out **immediately** to avoid spreading of the pest to outdoor plantations.

An integrated pest management strategy (indicated below) can be used for the control of *Tuta absoluta*:

- (1) Clearing the soil and area of crop residues, fruits and wild host plants.
- (2) Mass trapping begin prior or upon planting
- (3) The use of sulphur, neem oil, *Bacillus thuringensis* in conjunction with the application of either Deltamethrine, spinosad or Indoxacarb if occasional individuals of *Tuta absoluta* are observed
- (4) Elimination and burning of infected plants during the growing season and of the remnants of the crop immediately after the last fruits have been harvested.

Legal basis

- Plant Quarantine Act (CAP. 433) *Tuta Absoluta* (Control) Regulations 2010, L.N. 26 of 2010.
- Government Notice No. 232 of 5th March 2010, *Guidelines/Instructions for growers for the control and containment of Tuta absoluta*.
- Government Notice No. 831 of 10th August 2010, *Procedures for the destruction of tomato plant material in fields and greenhouses*.