

Tomato leaf miner/ American leaf miner management in Agricultural production systems **(Distribution, biology, damage and integrated management)**

Introduction

The tomato leaf miner; *Tuta absoluta* (Meyrick) is a devastating pest of tomato. This pest is crossing borders and devastating tomato production both in protected and open fields. Originating from Latin America, *T. absoluta* has recently spread via infested fruits and packaging material to Europe, North Africa and the Middle East. Given its aggressive nature and crop destruction potential, it has quickly become a key pest of concern in East Africa. Its primary host is tomato, although potato, aubergine, common beans and various wild solanaceous plants are suitable hosts. *Tuta absoluta* belongs to the order Lepidoptera and family Gelechiidae.

Stages of the pest:

Life cycle

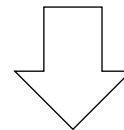
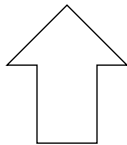
Tuta absoluta reproduces rapidly and can produce about 10 - 12 generations per year. Its life cycle ranges from 30 - 35 days. A mature female may lay up to 250 - 260 eggs during her life cycle which are deposited on aboveground plant parts. Egg hatching takes place 4 - 6 days after egg laying. As they mature, larvae become darker green in colour with a characteristic dark band posterior to the head capsule. There are four larval instars. In between moulting, caterpillars can temporarily be found outside the leaf mines or fruit. The larval period, which is the most damaging, is completed within 12 - 15 days. Larvae do not enter diapause when food is available. Pupation may take place in the soil or on the leaf surface, in a curled leaf or within mines. A cocoon is built if pupation does not take place in the soil. *Tuta absoluta* can overwinter as eggs, pupae or adults depending on environmental conditions. Moths are active during the night and hide between leaves during the day.



Small, cylindrical, creamy white to yellow eggs, 0.35 mm long.



First instar larvae are cream in colour with characteristic dark head. Larvae become greenish to light pink in second to fourth instars. Four larval



Adults are 6 mm length, wing span of 10 mm. Brown wings with silvery-grey scales and characteristic black spots present in anterior wing. Have long and filiform antennae (bead-like antennae) © Marja van der Stratén, NWWA Plant Protection Service, Bugwood.org.



Pupae are light brown, size is 6 mm.

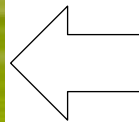


Figure 1: Life cycle of *Tuta absoluta*

2.3 Damage

Infestations of tomato plants can occur throughout the entire crop cycle. Feeding damage is caused by all larval instars and throughout the whole plant. On leaves, the larvae feed on the mesophyll tissue, forming irregular leaf mines which may later become necrotic. Inside these mines both the caterpillars and their dark frass can be found. In case of serious infestation, leaves die off completely. Larvae form extensive

galleries in the stems which affect the development of the plants. Fruits are also attacked by the larvae, and the entry-ways are used by secondary pathogens, leading to fruit rot before or after harvest. The caterpillars attack only green fruit. The extent of infestation is partly dependent on the variety. Potential yield loss in tomatoes (quantity and quality) is significant and can reach up to 100% if the pest is not managed. On potato, mainly aerial parts are attacked. However, damage on tubers has recently been reported.



Figure 2: Blotch shaped mines on the leaves.



Figure 3: Dark frass on the blotched mines © Margaret Kioko



Figure 4: Dark frass near the petiole.



Figure 5: Mining in the fruit.

Management of *Tuta absoluta*

Tuta absoluta is a very challenging pest to control. Effectiveness of chemical control is limited due to the insect's nature of damage as well as its rapid capability to develop resistance to insecticides. Sex pheromone traps are used as an early detection tool. Mass trapping and lure and kill application of pheromones have been found to be effective to mass capture adults of *Tuta absoluta*. IPM strategies are being further developed to achieve appropriate management of *Tuta absoluta*.

Biological control agents

1. Predatory capsid bugs (*Nesidiocorus tenuis* and *Macrolophus pygmaeus*) – targets eggs of *Tuta absoluta*
2. *Bacillus thuringiensis* – mainly targets larvae

Physical/ Mechanical tools

1. Clean the area of old fruits and plants.
2. Close greenhouse ventilation openings with insect netting.
3. Use Horiver Tuta sticky traps for monitoring and mass trapping of adult moths.
4. Use Delta trap together with pheromones for scouting and monitoring the adult moths
5. Use Tutasan water trap together with pheromones for mass trapping of the adult moths.

Compatible insecticides

1. Azadiractin - Neem seed extract acts as contact and systemic insecticide against *Tuta absoluta*

Integrated management strategy for *Tuta absoluta*

A sample integrated management system for *Tuta absoluta* will have the following components:

Pest target stage	Tool	Rationale	Remarks
Eggs	<i>Macrolophus pygmaeus</i> (Mirical)	Predates the eggs	Preferably start at propagation
Adult	Delta trap	Scouting and monitoring	Replace pheromone every 4 to 6 weeks & sticky plates when traps are full
Adult	Tutasan water trap	Mass trapping adults	Replace pheromone every 4 to 6 weeks and change water when full of adult moths
Adult	Horiver black	Monitoring and mass trapping of adults	Replace when full