

Tuta absoluta

A devastating pest of tomatoes and other related crops



Tuta  i PM

African
Fruit
Fly
Programme

(Programme Africain de la Mouche de Fruit)



Biology

What is *Tuta absoluta*?

This is a small moth known by the common name tomato leaf miner or tomato pin worm. It is an invasive pest that originated from South America and spread throughout Africa and beyond. It is a serious and devastating pest of tomatoes.



Tuta absoluta moth. The moth usually hides during the day and is mostly active at dusk

What crops does *Tuta absoluta* attack?

Tuta absoluta attacks a variety of crops such as tomato, eggplant, pepper, potato, tobacco, and various wild solanaceous plants such as datura. However, of all these, *Tuta absoluta* prefers and severely affects tomato.



Tomato plant damaged by *Tuta absoluta* caterpillars, dry out and the whole plant ultimately succumbs and die



Tomatoes rotting due to secondary infection

What plant part is attacked by *Tuta absoluta*?

The pest attacks any part of the plant including fruit, leaves, flowers, freshly growing plant tips and soft stems, though most damage is on the leaves and fruits.

How does *Tuta absoluta* damage tomato and other plants?

The *Tuta absoluta* moth lays its eggs, on any part of the plant. These eggs hatch into tiny caterpillars which burrow into leaves, stems and fruits. The caterpillars feed in a characteristic manner which can be distinguished from other insect pests.

What are the damage symptoms of *Tuta absoluta*?



Damage of leaves

The *Tuta absoluta* caterpillars burrow into leaves, eating away the green part of the leaf, thereby leaving characteristic mines with no definite shape. These mines can merge into large portions causing the leaves to dry out. The mines are easy to differentiate from those caused by the common tomato leaf miner which is not a moth but a fly.



Damage on fruits

Small *Tuta absoluta* caterpillars enter tomato fruits through a small hole they make to gain entry. This causes dark spots, which sometimes harden or act as entry for fungus and bacteria causing the rotting of fruit. Sometimes caterpillar entry causes deformation of the fruit resulting in tomatoes losing their physical appeal. Occasionally, *Tuta absoluta* caterpillars make holes in the tomato, which they use to exit and move on to other fruits, leaves or stems. Tomato fruits attacked by *Tuta absoluta* caterpillars rot and drop to the ground. This can cause 100% loss in tomato yield.



Tomatoes packed for transportation

How does *Tuta absoluta* spread?

Tuta absoluta moths (adults) can fly for long distances carried by wind currents. Infested tomato seedlings carried from one place to another can also help spread the eggs or caterpillars. Infested tomato fruits are often ferried to markets far and wide, even exported to other countries and regions, thereby spreading the infestation.

Management

Can *Tuta absoluta* be successfully controlled by tomato farmers?

Yes. Farmers can effectively control *Tuta absoluta* provided they have the right information and minimal resources. Tomato farming is a business and as such, farmers must invest in the business enterprise by budgeting for control measures. Even where tomatoes are produced for consumption only, there is need to apply control measures to ensure yield quality and quantity.

Chemical control

Is chemical control the only and best way to control *Tuta absoluta*?

The use of synthetic insecticides is very common and popular among farmers. However, *Tuta absoluta* is known to develop resistance to various classes of synthetic insecticides within a short period especially when insecticides are used without any coordination. Most of the synthetic insecticides currently being used by farmers will eventually cease to be effective against *Tuta absoluta* due to resistance.

Should farmers stop using synthetic pesticides?

The control of *Tuta absoluta* requires an Integrated Pest Management (IPM) approach, which encourages the use of several compatible approaches. Synthetic insecticides must be used sensibly with clear understanding of their harmful effects on human, animal and environmental health. Soft pesticides such as of bacterial and botanical origin can be used.

Other management methods

What options are available to control *Tuta absoluta*?

There are several methods which can be used by farmers to successfully control *Tuta absoluta*. These include regular monitoring, mass trapping, cultural control, biological control, greenhouse or field sanitation and chemical control when absolutely necessary. See below for explanations of each method.

Regular monitoring and mass trapping of *Tuta absoluta*?

Monitoring refers to the use of traps with pheromones (male lure) to trap *Tuta absoluta* in the field or greenhouse, as a way of giving an early warning of infestation. Trap catches will inform the farmer whether *Tuta absoluta* moths are in the farm or greenhouse and give an indication of whether populations are increasing or constant. Monitoring informs the farmer on when to apply control measures, the level of control required and what control measure(s) to use.



Delta traps used in monitoring and mass trapping. They are very effective when they are used early before *Tuta absoluta* populations are too high



Small rubber plugs which contain the lure. They release the lure slowly and can be effective up to 6 weeks in the greenhouse or open field



Ferolite which uses light and lures to capture *Tuta absoluta* moths. Farmers are encouraged to use substitutes such as modified basins with water and lure to trap moths



Cultural control of *Tuta absoluta*

Farmers are discouraged from planting tomatoes on the same portion of land in continuous cropping seasons. However, because of small pieces of land, moving to a different land, might not be feasible. Thus, farmers are encouraged to plough the field or dig by hand before transplanting seedlings in order to expose *Tuta absoluta* cocoons (pupae) and caterpillars to the sun's heat and predators such as birds. Farmers are also encouraged to plant tomato varieties showing relative resistance to *Tuta absoluta* damage. Those who can afford may consider, the use of greenhouses as opposed to open fields.

The *Tuta absoluta* parasitoid, which is a “farmers friend” searching for *Tuta absoluta* caterpillars in the leaf. Out of every 100 *Tuta absoluta* caterpillars, the parasitoid can lay its eggs in over 70 caterpillars! Thus, it is very effective.



Poor disposal of tomatoes infested with *Tuta absoluta*. Farmers are encouraged to bury such tomatoes underground in order to break the *Tuta absoluta* life cycle

Mass trapping of *Tuta absoluta*

Mass trapping is simply monitoring which has been taken to the next level. The farmer deploys more traps than would be used for monitoring. Normally 20 traps per acre in open fields is recommended. Male *Tuta absoluta* moths are attracted by the male lure and they get stuck to the trap or fall into the trap and are killed by toxicant depending on the type of trap used. This means female moths will be left without males to mate with, thus their eggs are unfertilized. This results in the crushing or significant drop of future generations of *Tuta absoluta*.

Greenhouse/field sanitation to control of *Tuta absoluta*

Sanitation refers to cleanliness in the farm or greenhouse. Farmers are encouraged to pick infested tomatoes and uproot wilting infested plants and bury them underground to break the life cycle of *Tuta absoluta*. Sanitation kills the pest’s eggs, caterpillars, and cocoons. *icipe* is currently promoting the use of a tent like structure called an Augmentorium in which infested tomatoes and plant material are loaded. The holes of the Augmentorium allows the parasitoid to escape while the bigger moths die inside the structure.

Biological control of *Tuta absoluta*



Some of the biopesticides developed by *icipe* and currently being used to control fruit flies, thrips and other pests. The biopesticide specific to *Tuta absoluta* is currently being developed for commercialization.



Delta trap (left) and water trap (right) for *Tuta absoluta* monitoring and control. The farmer can make his own water traps using old basins



Tuta absoluta caterpillars feeding on the green part of the leaf.

Where can farmers buy lures, traps and other materials for *Tuta absoluta* control?

Tuta absoluta lures, traps and other materials can be procured from various companies such as Farm Track, Kenya Biologics, Real IPM, Dudutech and Koppert Biological Systems. *icipe* and its donors do not in any way endorse the purchase of products from these companies and mention of these companies is merely for noting and reference.

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icipe – Working in Africa for Africa...

International Centre of Insect Physiology and Ecology (*icipe*) – was established in 1970 in direct response to the need for alternative and environmentally-friendly pest and vector management strategies. Headquartered in Nairobi, Kenya, *icipe* is mandated to conduct research and develop methods that are effective, selective, non-polluting, non-resistance inducing, and which are affordable to resource-limited rural and urban communities. *icipe's* mandate further extends to the conservation and utilisation of the rich insect biodiversity found in Africa.

icipe contributes to sustainable food security in Africa through the development of integrated pest management systems for major agricultural and horticultural crops. Such strategies include biological control and use of behaviour-modifying and arthropod-active botanicals. *icipe* puts emphasis on control approaches that have no detrimental impact on the environment. These options are always designed to fit the needs of the farmers and are developed on-farm and with farmers' participation. In addition to fruit flies, other key areas of *icipe's* research include pests of tomato, brassicas, beans, and staple food crops such as maize and sorghum.

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