**South American Tomato Leafminer**

*Tuta absoluta*

*Tuta absoluta*, the South American tomato leafminer (Lepidoptera: Gelechiidae) is a serious pest of tomatoes that has been reported to cause crop losses as high as 80 to 100% in the absence of intensive chemical intervention in areas that it has invaded. Often referred to simply as ‘Tuta’, it is currently found in most countries of South America, in Panama and Costa Rica, and is slowly expanding its range northward through Central America. In 2007, this leafminer was found in a few greenhouse tomato production facilities in Spain. Despite extensive efforts to slow the spread of this insect outside the initial introduction areas, it moved throughout southern Europe in about 3 years. Its rapid spread has continued throughout North Africa, and into West Asia. Although it has not yet been found in North America, projections from computer models suggest that the South American tomato leafminer could establish in many areas of the United States where it is likely to become a serious threat to commercial tomato production.

**Damage Caused by the Leafminer**

The South American tomato leafminer damages tomato plants by mining the leaves and boring into apical and flower buds and fruit. When feeding on leaves, the larvae create irregularly shaped mines that increase in size as the larva grows (Fig 1). Eventually the larva may leave the original mine and move to another part of the leaf or plant to feed. A larva feeding inside a developing shoot or bud can cause the structure to die resulting in poor plant architecture and fruit set. Young larvae may burrow into the fruit to form galleries in which they feed. The leaf mines and the galleries in the fruit may be invaded by secondary pathogens, resulting in necrosis on the leaf and in the fruit. This results in unmarketable fruit (Fig. 2).

The damage caused by the South American tomato leafminer is very similar to that caused by the tomato pinworm, *Keiferia lycopersicella* (Lepidoptera: Gelechiidae), an indigenous tomato pest. Both leafminers cause “blotch-type” mines in leaves that increase in size as the larva molts and grows. These larger mines often contain visible excrement; occasionally the larva can be seen in the mine as well (Fig. 3). The damage caused to tomato fruit by these two leafminers is nearly identical. The larvae of both species bore into the fruit surface, leaving only a surface hole or yellowish mine. It is generally difficult to distinguish fruit damage between the two pests.

**Life Cycle**

South American tomato leafminer adults are small, silvery-brown moths, about 3/16 of an inch (4.5 mm) in length (Fig. 4). They are most active at dusk and dawn, and rest on leaves and other plant parts during the day. Female moths lay...
eggs on different plant parts (e.g., the underside of leaves, petioles, blossom, or fruit), either singly or in small batches (Fig. 5). A newly hatched larva penetrates the plant tissue on which the egg was laid and begins to feed resulting in a leaf mine, stem mine, or damage to the fruit. Each larva (Fig. 6) completes 4 larval instars before either leaving the leaf mine or fruit gallery to pupate. The pupa can be found in a silken cocoon either folded into the edge of a leaf or on the soil surface. At temperatures of 80°F, the entire life cycle is completed in about 23 to 32 days. The insect has multiple generations a year and will continue to complete life cycles as long as host plants are present and temperatures are favorable for development.

Although the South American tomato leafminer prefers to feed on tomato, when tomatoes are not available it can feed and reproduce on alternate hosts such as potato, eggplant, pepper, and solanaceous weeds like black nightshade or hairy nightshade. However, its reproductive potential on these alternate hosts is much lower in comparison to tomato.

Guidelines

The South American tomato leafminer is considered to be one of the most important insect pests of tomato in areas where it has become established. In order to avoid serious crop loss, its management in newly invaded areas currently relies on repeated insecticide applications. This increases risk of insecticide resistance and other insecticide-related issues. Research is being conducted in more recently invaded regions to determine if biological control can be integrated with insecticides to provide a more sustainable pest management program.

South American tomato leafminer spreads via commercial trade of plants and fruit infested with eggs, larvae, and pupae. The adult moths can fly, but it is not known if this movement contributes significantly to its spread. There are numerous regulations in place that should limit the spread of the South American tomato leafminer in imported commercial tomato plants and fruit. However, movement of fruit and plants by private individuals is more difficult to stop.

Early detection of the presence of this devastating pest could limit the impact of this pest on United States tomato production. If an infestation is suspected, notify your local state department of agriculture or local USDA, APHIS, PPQ office.

Acknowledgments

This publication was supported by the Specialty Crop Block Program at the U.S. Department of Agriculture (USDA) through Grant 14-SCBGP-CA-006. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the USDA. Photos were provided by J. Arno, J. Riudavets, and, A Mussoll, IRTA, Cabrils, Spain.

Authors

Kristine E. Godfrey, Contained Research Facility, University of California, Davis
Frank G. Zalom, Department of Entomology and Nematology, University of California, Davis

For more information about the South American tomato leafminer, control recommendations, and state resources visit our Web site at: ncpmc.org/action/alerts/tuta.php

For information about the Pest Alert program, please contact Laura Iles, co-director of the North Central IPM Center, at lj166@iastate.edu.

This publication was produced and distributed by USDA-NIFA Regional IPM Centers and the 1862 Land-Grant Universities.

1862 Land-Grant Universities

Auburn University • University of Alaska • University of Arizona • University of Arkansas • University of California • Colorado State University • University of Connecticut • University of Delaware • University of the District of Columbia • University of Florida • University of Georgia • University of Guam • University of Hawaii • University of Idaho • University of Illinois • Purdue University • Iowa State University • Kansas State University • University of Kentucky • Louisiana State University • University of Maine • University of Maryland • University of Massachusetts • Michigan State University • University of Minnesota • Mississippi State University • University of Missouri • Montana State University • University of Nebraska • University of Nevada • University of New Hampshire • Rutgers • New Mexico State University • Cornell University • North Carolina State University • North Dakota State University • Ohio State University • Oklahoma State University • Oregon State University • Pennsylvania State University • University of Puerto Rico • University of Rhode Island • Clemson University • South Dakota State University • University of Tennessee • Texas A&M University • Utah State University • University of Vermont • University of the Virgin Islands • Virginia Polytechnic Institute & State University • Washington State University • West Virginia University • West Virginia State University • University of Wisconsin • University of Wyoming.

This work is supported by the Crop Protection and Pest Management Program (2014-70006-22486) from the USDA National Institute of Food and Agriculture.