Screening Aid

Guatemalan Potato Moth

Tecia solanivora (Povolný)

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The Guatemalan potato moth, *Tecia solanivora* (Povolný) is a member of the potato tuber moth (PTM) complex, a group of three moths in the Gelechiidae that are important pests of potatoes (*Solanum tuberosum*) in both the field and in storage. Although a native of Central America, *T. solanivora* has been introduced to Mexico, South America (Colombia, Ecuador, Venezuela, and Peru), and the Canary Islands of Spain. Larvae feed inside potato tubers, leaving behind frass, exuviae, and promoting rot that renders the crop unfit for sale or consumption. Signs of damage are not visible in above-ground plants and only become obvious in tubers as small exit holes once the larvae leave to pupate.

Fig. 1: Adult male of *Tecia solanivora* showing longitudinal lines on forewings (Photo by Hanna Royals).

The moths making up the PTM complex are members of the Gelechiidae (Lepidoptera), one of the largest families of microlepidoptera with about 500 genera worldwide. These moths are characterized by long upturned labial palpi, a scaled proboscis, and hindwings with a falcate or pointed apex.

Tecia solanivora males are dark brown with 2-3 dark spots in the discal cell and faint longitudinal lines along the forewings. Females are lighter brown than males with 2-3 spots and conspicuous longitudinal marking along the forewing. Forewing length ranges from 8-13 mm, and females are typically larger than males. *Tecia solanivora* resembles many other species of gelechiids, but can be distinguished by their relatively large size and forewing pattern. However, forewing coloration and markings are often difficult to observe in trapped specimens and species-level identification should be performed by a specialist based on genitalic dissection. Two other gelechiids, *Phthorimaea operculella* and *Symmetrischema tangolias*, comprise the remainder of the PTM complex and are also commonly refered to as potato tuber moths, generating some confusion in the literature when only the common name is used. Both *P. operculella* and *S. tangolias* occur in the United States.

Fig. 2: Symptoms of larval infestation of *Tecia solanivora*: (a) galleries inside tubers and (b) exit holes of emerging larvae outside of tubers (Photos: Courtesy of CIP).

This aid is designed to assist in the sorting and screening *T. solanivora* suspect adults collected from CAPS pheromone (sticky) traps in the continental United States. It covers basic sorting of traps and first level screening, all based on morphological characters. Basic knowledge of Lepidoptera adut morphology is necessary to screen for *T. solanivora* suspects.

Tecia solanivora pheromone traps should be sorted initially for the presence of moths of the appropriate size, color, and shape. Traps that contain moths meeting all of the following requirements should be moved to Level 1 Screening (Page 3):

1) Moths have a forewing length of 8-13 mm (Fig. 3).

2) Moths have an overall shape that is similar to the outline depicted in Fig. 3. Note that moths caught on their side or back may have a different outline.

3) Moth forewings are lanceolate, dark to light brown, and have variable markings (Fig. 4).

Note that the appearance of moths caught in sticky traps can vary substantially depending on the amount of sticky glue on the moth (most individuals usually appear darker when covered in glue). For this reason, any small, gelechiid-like moth meeting the above criteria should be sent forward to Level 1 Screening.

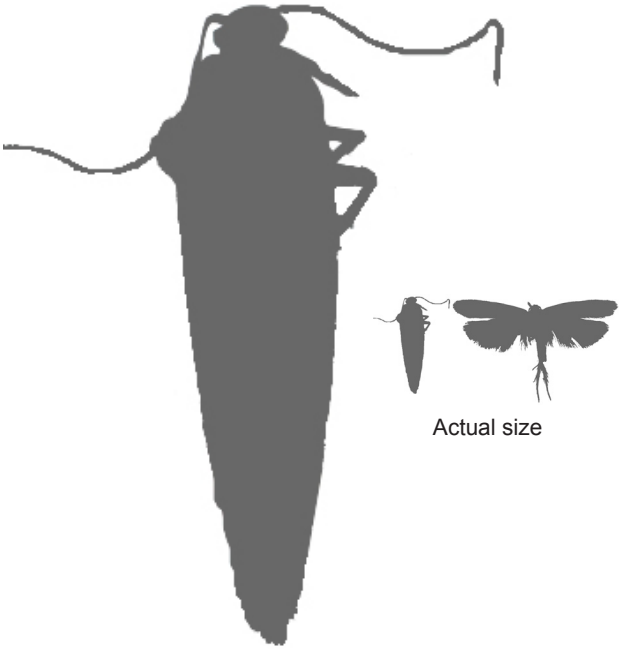


Fig. 3: Outline and size of a resting *T. solanivora*. Many gelechiids that resemble *T. solanivora* have a similar appearance: resting with wings held in a roof-like position over the body.

Fig. 4: Sexual size difference of *T. solanivora* adults (top = male; bottom = female). Females are larger than males, lighter in color, and have conspicuous longitudinal markings along forewing. Males are darker, with more prominent spots in the discal cell. Longitudinal markings may be difficult to see in males due to darker coloration.

Moths that meet the sorting requirements should be screened for suspect gelechiids. Level 1 Screening may be difficult for small moths (like gelechiids) and may need to be performed by a trained Lepidopterist. When in doubt distinguishing or evaluating first-level screening characters, forward traps that have passed the sorting requirements to a trained taxonomist. Suspect gelechiids in traps should not be manipulated or removed for screening unless expertise is available.

Gelechiid moths can be identified by the following combination of characters (note that some characters may be difficult to see on specimens coated in sticky trap glue):

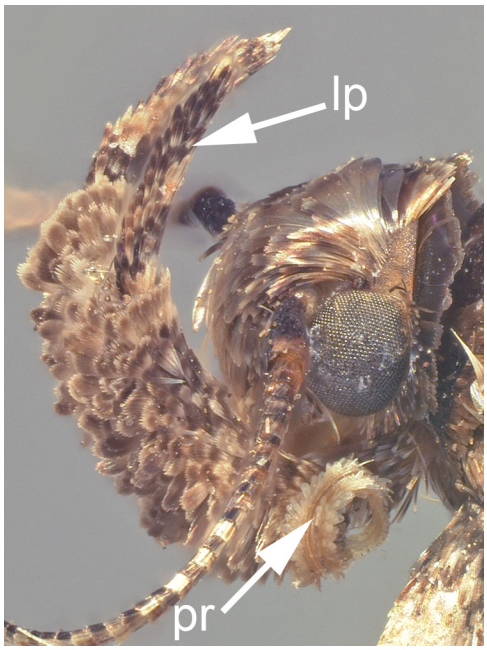
1) Thread-like elongate antennae (Figs. 3-4).

2) Forewing lanceolate to elongate–ovate (Fig. 4).

2) Hindwing subrectangular to trapezoidal with a falcate or pointed apex (Fig. 4).

3) Long, strongly upcurved labial palpi (Fig. 5).

4) Scaled proboscis (tongue) (Fig. 5).



Figs. 5: Upcurved labial palpi (lp) of *Tecia solanivora* and scaled proboscis (pr) (Photo by James Hayden, Microlepidoptera on Solanaceae, www.idtools.org)

Moths meeting the above criteria should be forwarded for additional identification. Traps to be forwarded to another facility should be carefully packed following the steps outlined in Fig. 6. Traps should be folded, with glue on the inside, making sure the two halves are not touching, secured loosely with a rubber band, and placed in a plastic bag for shipment. Insert 2-3 styrofoam packing peanuts on trap surfaces without moths to cushion and prevent the two sticky surfaces from sticking during shipment to taxonomists. DO NOT simply fold traps flat or cover traps with transparent plastic wrap (or other material), as this will guarantee specimens will be seriously damaged or pulled apart – making identification difficult or impossible.

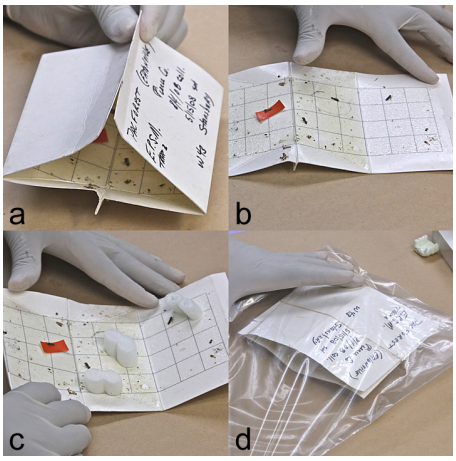


Fig. 6: Recommended packing method for shipment of sticky traps: a & b) open and unfold trap; c) place 2-3 packing peanuts in areas of trap with no moths; d) fold trap, secure with rubber band, and place in plastic bag.

Fig. 7: *Aristotelia* sp.

Fig. 8: *Chionodes mediofuscella*

Fig. 9: *Chionodes thoraceochrella*.

Fig. 10: *Coleotechnites* sp.

Fig. 11: *Prolita variabilis*

Fig. 12: *Prolita invariabilis*

Fig. 13: *Scrobipalpopsis tetradymiella*

Fig. 14: *Teleiopsis baldiana*

Some of the North American gelechiid non-targets that could be confused with *T. solanivora* are shown in Figs. 7-14. Note that these species have not been verified to be attracted to *T. solanivora* pheromone traps and non-targets vary in different parts of the country (Photos by Hanna Royals, Figs. 7-12,14; Jean-Francois Landry, CNC, Fig. 13). Information on the two species in the potato tuber moth complex currently present in the U.S. is listed on Page 5.

Potato Tuber Moth Complex

Guatemalan Potato Moth

Tecia solanivora (Povolný)

The potato tuber moth (PTM) complex refers to three moths in the family Gelechiidae that are important pests of potatoes in many parts of the world. The complex consists of *Phthorimaea operculella* (Zeller) (Fig. 15), *Symmetrischema tangolias* (Gyen) (Fig. 16), and *Tecia solanivora* (Povolný) (Fig. 17), collectively referred to as the "potato tuber moths" or "potato tuberworms." The use of these common names in the literature can be confusing because all three species are native to Central and South America and their larvae cause similar damage.

Fig. 15: *Phthorimaea operculella* (Photo by James Hayden, Microlepidoptera on Solanaceae, www.idtools.org).

Phthorimaea operculella, the potato tuber moth, is a native of South America that has spread throughout the New World and has been introduced to Europe, Africa, Australasia, and generally anywhere in the world where potatoes are grown. It is widespread in the U.S., occuring from California across the southern states and in much of the East. This species feeds on potatoes and a variety of other plants in the Solanaceae. It is also a pest of tobacco and is also referred to as the tobacco splitworm.

Fig. 16: *Symmetrischema tangolias* (Photo by James Hayden, Microlepidoptera on Solanaceae, www.idtools.org).

Symmetrischema tangolias, the South American potato tuber moth, is a native of South America that has been introduced to North America and Australasia. In the U.S., it has been recorded from California, Washington, and Louisiana. Larvae are recorded feeding on a variety of solanaceous hosts, but in the U.S. they appear to prefer weeds such as *Solanum nigrum* (black nightshade) instead of crops.

Fig. 17: *Tecia solanivora* (Photo by Hanna Royals).

Tecia solanivora, the Guatemalan potato moth, is a native of Central America that has been introduced to Mexico, South America (Colombia, Ecuador, Venezuela, and Peru), and the Canary Islands of Spain. It has not been recorded from the U.S. Larvae are monophagous and *Solanum tuberosum* (Irish potato) is the only recorded host.

It is not know if *P. operculella* and *S. tangolias* are attracted to *T. solanivora* pheromone traps, although *S. tangolias* shares one of the same pheromone components. Because identification to species is difficult for this group, forward for identification any specimens that meet the critera for Level 1 Screening.

Key to Sort and Screen *Tecia solanivora* Suspects in the United States

1. Moths approximately 8-13 mm long; overall shape typical gelechiid-like (Fig. 3); and forewings dark or light brown with longitudinal markings and darker spots (Fig. 4) 2
1'. Moths larger or smaller than 8-13 mm long; overall shape not typically gelechiid; or forewing color not dark or light brown with longitudinal markings and darker spots .....Not *T. solanivora*

2. Antennae filiform; hindwings subrectangular with a pointed apex; labial palpi long and strongly upcurved; and proboscis scaled..... ***T. solanivora suspect***
2'. Antennae not filiform; hindwings not subrectangular with a pointed apex; labial palpi not long and strongly upcurved; or proboscis not scaled.....Not *T. solanivora*

Citation

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References for more information on *T. solanivora* and non-targets

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