

CAPS Datasheets provide pest-specific information to support planning and completing early detection surveys.

Tecia solanivora

Scientific Name

Tecia solanivora (Povolný, 1973)

Synonym(s):

Scrobipalopsis solanivora Povolný 1973

Common Name

Guatemalan potato moth, Guatemala tuber moth, Central American potato tuberworm

Type of Pest

Moth, borer

Taxonomic Position

Class: Insecta, **Order:** Lepidoptera,
Family: Gelechiidae



Figure 1. *Tecia solanivora* adult moth (Photo courtesy of Katja Poveda, Cornell University, [CC BY-NC 3.0 US](https://creativecommons.org/licenses/by-nc/3.0/us/))

Pest Recognition

This section describes characteristics of the organism and symptoms that will help surveyors recognize possible infestations/infections in the field, select survey sites, and collect symptomatic material. For descriptions of diagnostic features, see the Identification/Diagnostic resources on the AMPS pest page on the CAPS Resource and Collaboration website.

Pest Description

Adults

Adult moths (Fig. 1) have lens-shaped forewings and larger hindwings with many fringes. Males (Fig. 2A) and females (Fig. 2B) are distinguished based on size and coloration. Females are visibly larger, light brown in color with a distinctive pattern of light brown longitudinal lines and three distinct patterns of marginal spots on the forewings. Males are dark brown with scarcely visible longitudinal lines and two marginal spots on the forewings (Povolný, 1973). Adults are found hiding among potato foliage in the field or among tubers and boxes in storage (Torres et al., 1997).



Figure 2. *Tecia solanivora* adult moth (A) male and (B) female (Photos courtesy of Hanna Royals, Bugwood.org, [CC BY-NC 3.0 US](https://creativecommons.org/licenses/by-nc/3.0/us/)).

Eggs

Newly laid eggs (Fig. 3A) are pearl white, turning yellowish as they age and gray when close to hatching (Torres et al., 1997). They measure 0.46-0.63 mm in length and 0.39-0.43 mm in width ($<1/16$ in.) (Povolný, 1973). Eggs are laid singly or in a group on soil near the base of the plant. Sometimes eggs are laid on foliage or on potatoes in warehouses (Povolný, 1973).

Larvae

Larvae typically measure 1.2-1.6 mm ($<1/16$ in.) long in the first instar to approximately $1/2$ in. long in the final instar (Fig. 3B,C). They are transparent white with the head and prothoracic shield (capsule in first thoracic segment) dark brown (first instar), becoming cream colored with darker coffee-colored spots (second instar), and then yellow-green with more visible spots along the body and head and prothoracic shield dark brown (third instar) (Torres et al., 1997). The final instar larvae have a red coloration near the head and prothoracic shield that fades to pink or white on the underside and sides of the larva (Fig. 3C) (Povolný, 1973). The larvae are found feeding within the potato tuber (Povolný, 2004b).

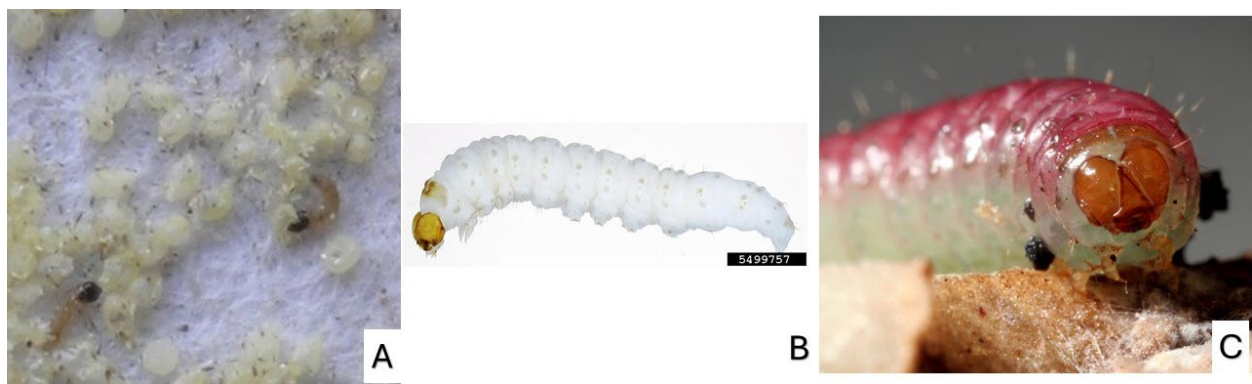


Figure 3 *Tecia solanivora* eggs (A), larva (B), and larva showing red body coloration (C) (Photos courtesy of: (A) James Hayden USDA APHIS PPQ; (B) Henry Juarez, International Potato Center, Bugwood.org [CC BY-NC 3.0 US](https://creativecommons.org/licenses/by-nc/3.0/us/), and (C) Katja Poveda, Cornell University, [CC BY-NC 3.0 US](https://creativecommons.org/licenses/by-nc/3.0/us/))

Pupae

Young pupae are initially greenish, turning light brown and gradually dark brown as they age. The cocoons are silken and covered with small pieces of soil and detritus. The length of the pupa is approx. $\frac{3}{8}$ in. (Fig. 4) (Povolný, 1973). Pupation takes place in soil, near the surface. In storage buildings, the larvae usually spin cocoons in cracks and corners, but they may also pupate in the burlap sacks used for transporting potatoes. In rare cases, the larvae may pupate in or on tubers (Povolný, 1973).



Figure 4. *Tectia solanivora* pupa (Source: Henry Juarez, International Potato Center, Bugwood.org, [CC BY-NC 3.0 US](https://creativecommons.org/licenses/by-nc/3.0/us/)).

Signs and symptoms:

Tectia solanivora attacks potatoes in fields and storage. Signs of damage are not visible on the above-ground parts of the plant (Royals et al., 2017). Larvae develop within tubers, creating feeding galleries that contain residues of food, frass, and shed skins (Fig. 5A). Larval feeding causes tuber weight loss and shrinking and can completely destroy them.



Figure 5. Signs of *Tectia solanivora* infestations: larval galleries inside potatoes (A) and exit holes on potatoes (B). (Sources: (A) Katja Poveda, Cornell University, [CC BY-NC 3.0 US](https://creativecommons.org/licenses/by-nc/3.0/us/), (B) Henry Juarez, International Potato Center, Bugwood.org, [CC BY-NC 3.0 US](https://creativecommons.org/licenses/by-nc/3.0/us/))

Entry holes may remain inconspicuous, and no external signs are seen until larvae leave the tuber through small circular exit holes of $1/16$ - $1/8$ in. (Fig. 5B) (Povolný, 2004a). Damage caused by *T. solanivora* can lead to secondary rotting. Tubers infested by the pest develop a bitter taste and are unsuitable for human and livestock consumption (Kroschel et al., 2013).

Easily Mistaken Species

Tecia solanivora is a member of the potato tuber moth complex which also includes *Phthorimaea operculella* (potato tuberworm) and *Symmetrischema tangolias* (Andean potato moth) (Gelechiidae) (Fig. 6). *Tecia solanivora* can easily be distinguished from the other two moths based on forewing coloration and markings or by dissection of genitalia (Royals et al., 2017).

Phthorimaea operculella (Fig. 6A) is native to South America and is present in the western (California, Oregon, Washington, and Idaho), southern (Georgia, North Carolina, South Carolina, and Texas) and eastern United States (Maryland, Virginia, New York, New Jersey and Massachusetts) (Rondon et al., 2007). It feeds on solanaceous plants, including potato (*Solanum tuberosum*), tomato (*S. lycopersicum*), eggplant (*S. melongena*), black nightshade (*S. nigrum*), and tobacco (*Nicotiana tabacum*) (Kroschel et al., 2013).

Symmetrischema tangolias (Fig. 6B) is also native to South America and is present in California, Washington, and Mississippi (Sporleder et al., 2016). It only attacks black nightshade in North America (Sporleder et al., 2016).

Other gelechiid species that could be confused with *T. solanivora* in the United States include *Aristotelia* spp., *Chionodes mediofuscella*, *C. thoraceochrella*, *Coleotechnites* spp., *Prolita invariabilis*, *P. variabilis*, *Scrobipalopsis tetradymiella* and *Teliopsis baldiana* (Royals et al., 2017). These species have not been verified to be attracted to *T. solanivora* pheromone traps.



Figure 6. Adult gelechiid moths present in the United States: **(A)** *Phthorimaea operculella* and **(B)** *Symmetrischema tangolias* (Sources: (A) James Hayden USDA APHIS PPQ, (B) Kurt Ahlmark, USDA APHIS PPQ, Bugwood.org, [CC BY-NC 3.0 US](https://creativecommons.org/licenses/by-nc/3.0/us/))

Commonly Encountered Non-targets

The approved survey method is pheromone trapping using a delta trap with the *Tecia solanivora* lure ((*E*)-3-dodecenyl acetate, (*Z*)-3-dodecenyl acetate, and dodecyl acetate). This lure is species-specific (Schrader et al., 2019), but other insects are likely to be captured in traps.

Insects from multiple orders are attracted to the components of this pheromone blend. The most common moths attracted to the pheromone include sugarbeet moth, vetch moths, marsh neb moth, yellowneck, goat moth, blossom moth, leafminer, bollworm, stalk borer, cutworm, tussock moth, web moth, and burnet (El-Sayed, 2024). Of these, moths belonging to the family Gelechiidae are the most morphologically similar to *T. solanivora*. The following moths are attracted to one or more components of the lure blend and are present in the United States: *Agnippe prunifoliella*, *Metzneria* spp., and *Isophrictis similiella* (El-Sayed, 2024).

Note that these species are attracted to one or more of the components of the *T. solanivora* lure but have not been verified to be attracted to *T. solanivora* pheromone traps and that non-targets encountered during CAPS surveys will vary by region.

Biology and Ecology

Adults are active at dusk and night (Povolný, 2004a) and can fly short distances. Mating and egg laying occur in the evening (Bosa et al., 2006). Mated males and females live for an average of 15 and 20 days, respectively (Torres et al., 1997). Females lay eggs two days after mating and the egg laying period lasts for 7-23 days (Torres et al., 1997). Females can lay up to 279 eggs (Notz, 1996; Torres et al., 1997). Females usually lay eggs on soil near the plant base, on uncovered tubers, and occasionally on the foliage of plants or stems. In storage, eggs can be laid on tubers, on potato storage bags, or elsewhere in the building (Povolný, 1973).

After hatching, larvae penetrate the soil and attack the tubers. They enter tubers through potato eyes or skin and leave indistinguishable entrance holes (Carrillo et al., 2013). The larvae initially feed and create galleries near the surface of the tuber and later move deeper into the potato (Hilje, 1994). The above ground parts of potato plants are rarely attacked. Larvae undergo four instars before pupation. Under laboratory conditions, the larval stage takes 18-80 days depending on the temperature (Notz, 1996). Mature larvae leave the tubers to pupate, leaving small exit holes (approx. $\frac{1}{16}$ - $\frac{1}{8}$ in.) in the tubers.

After exiting the tubers, larvae form cocoons made of silk and other material to pupate (Carrillo et al., 2013). Pupation occurs near the surface of the soil (Povolný, 2004a). In storage facilities, pupation can occur on walls, in corners, or on burlap sacks used for moving potatoes. Larvae rarely pupate in or on tubers. The pupal stage lasts 13-15 days (Povolný, 1973).

In a laboratory study, *T. solanivora* had 2-10 generations per year depending on the temperature, with each generation lasting 42-95 days (Notz, 1996). Generations can occur at 4- to 5-week intervals in storage facilities (Povolný, 2004a). The minimum temperature for development is 45-48°F (ECONEX, 1998). Development is shortened at higher temperatures (Notz, 1996; Torres et al., 1997).

The species can adapt to different climatic conditions, from subtropical zones at 1600 ft. to colder zones at >11,000 ft. (Carnero et al., 2008; Carrillo et al., 2013; Povolný, 1973). Heavy rain may be a limiting factor on pest development (Kroschel et al., 2013).

Known Hosts

Potato (*Solanum tuberosum*) is the only host for this pest that 1) is infested under natural conditions, 2) is frequently described as major, primary, or preferred, and 3) has

primary evidence for feeding and damage documented in the literature (Povolný, 1973; Roblero et al., 2011). Additionally, a potato sub-species, *Solanum tuberosum ssp. andigenum* (= *S. chaucha*, *S. phureja*) (Andean potato), is also susceptible to *T. solanivora* infestation in laboratory settings (Cadena et al., 2005; Cifuentes et al., 2004). Potato is commercially produced globally and *T. solanivora* causes economically significant damage (Arias et al., 1996; Hilje, 1994; Povolný, 1973).

Pest Importance

Tecia solanivora is a major pest of potatoes (Kroschel et al., 2013; Pollet et al., 2003). The tunneling of potato tubers by larvae causes severe damage both in fields and traditional storage facilities (Kroschel et al., 2013). Infested tubers have low yield and the infestation renders tubers unfit for human consumption and as seed (Kroschel et al., 2013). Under favorable environmental conditions and poor management practices, *T. solanivora* can cause complete yield loss in field (Arias et al., 1996) or storage conditions (Schaub et al., 2016; Vargas et al., 2004).

In 2023, 44 billion pounds of potatoes were harvested in the United States, with a total value of \$5 billion. The top potato-producing states in the United States include Idaho, Washington, Wisconsin, North Dakota, California, Oregon, Michigan, Minnesota, Maine, and Colorado (USDA-NASS, 2024).

Tecia solanivora is regulated as a quarantine pest by the European and Mediterranean Plant Protection Organization (EPPO, 2023) and is listed as a harmful organism in Chile, Eurasian Customs Union, European Union, Japan, Morocco, Peru, Republic of Korea, Taiwan, and Turkey (USDA-PCIT, 2024). There may be trade implications with these countries if this pest is established in the continental United States.

Pathogens or Associated Organisms Vectored

This species is not known to be associated with pathogens or other organisms.

Known Distribution

Table 1. Known distribution of *Tecia solanivora*

Region/Continent	Country	Reference
Europe	Spain (including the Canary Islands)	Puillandre et al., 2008; Rios Mesa et al., 2020
North America	Mexico	Roblero et al., 2011
Central America	Costa Rica	Gómez-Bonilla et al., 2011; Povolný, 1973
Central America	Guatemala	Povolný, 1973; Puillandre et al., 2008
Central America	Panama	Pittí Araúz, 2020; Povolný, 1973
South America	Colombia	Bosa et al., 2006; Puillandre et al., 2008
South America	Ecuador	Puillandre et al., 2008; Torres-Leguizamón et al., 2011

Region/Continent	Country	Reference
South America	Venezuela	Puillandre et al., 2008; Torres, 1998

Tecia solanivora is reported to be present in El Salvador, Honduras, and Nicaragua; however, we could not locate direct evidence to confirm these records.

Pathway

Tecia solanivora is primarily introduced into new areas through the movement of infested seed potatoes and potatoes for consumption (Puillandre et al., 2008; Torres-Leguizamón et al., 2011). Spread may also occur when eggs or pupae are carried on potato plants, reused potato bags, and infested soil (Povolný, 2004a). Natural spread is limited to adult flights into nearby fields and storage facilities; adult moths cannot disperse over long distances (Povolný, 2004b).

The most likely pathway of introduction into the United States will be through importation or smuggling of infested potatoes or seed potatoes.

The import of potato plants for planting or seed potatoes from all countries except Canada in all ports in the United States is not authorized pending pest risk analysis (USDA ACIR, 2024).

Use the PPQ Commodity Import and Export manuals listed below to determine 1) if host plants or material are allowed to enter the United States from countries where the organism is present and 2) what phytosanitary measures (e.g., inspections, phytosanitary certificates, post entry quarantines, mandatory treatments) are in use. These manuals are updated regularly.

Agricultural Commodity Import Requirements(ACIR) manual: ACIR provides a single source to search for and retrieve entry requirements for imported commodities. <https://acir.aphis.usda.gov/s/>

Potential Distribution within the United States

Only areas where potatoes are grown are at risk for establishment of *T. solanivora*. *Tecia solanivora* can inhabit fields at elevations from 1600 ft. to >11,000 ft. depending on the altitudinal temperature gradient (Carnero et al., 2008; Carrillo et al., 2013).

Based on the known distribution data of *T. solanivora* and comparing those environments to plant hardiness zones (Takeuchi et al., 2019), we would expect that this pest could establish in plant hardiness zones 7-13. The southern United States is at risk for establishment due to suitable environmental conditions.

The top ten potato-producing states are Idaho, Washington, Wisconsin, North Dakota, California, Oregon, Michigan, Minnesota, Maine, and Colorado. Other potato-producing states include Florida, Nebraska, Oregon, and Texas (USDA-NASS, 2024).

Survey and Key Diagnostics

Approved Methods for Pest Surveillance*:

For the current approved methods and guidance for survey and identification, see Approved Methods for Pest Surveillance (AMPS) pest page on the CAPS Resource and Collaboration website, at <https://approvedmethods.ceris.purdue.edu/>.

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Versions

April 2012: Datasheet completed (Version 1)

July 2025: Datasheet revised (Version 2)

- Added **Pest Recognition** section
- Added **Easily Mistaken Species** section
- Added **Commonly Encountered Non-targets** section
- Updated **Biology & Ecology** section
- Updated **Known Hosts** section
- Updated **Pest Importance** section
- Updated **Pathogens or Associated Organisms Vectored** section
- Updated **Known Distribution** section
- Updated **Pathway** section
- Updated **Potential Distribution within the United States** section

Reviewer(s)

Diego F. Villanueva Mejía, M.Sc., Ph.D.– School of Applied Sciences and Engineering, EAFIT University