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

Stenoma catenifer

Scientific Name
Stenoma catenifer Walsingham, 1912

Synonym(s):
None

Common Name
Avocado seed moth,
avocado borer, avocado moth, avocado seed worm

Type of Pest
Moth, borer

Taxonomic Position
Class: Insecta, **Order:** Lepidoptera, **Family:** Depressariidae

Figure 1. *Stenoma catenifer* adult. Photo credit: Hanna Royals, Screening Aids, USDA-APHIS-PPQ, Bugwood.org; CC 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

Stenoma catenifer is a small moth with a wingspan of 1-1$^{3}/_{16}$ in. (Fig. 1), with a body length (from the tip of the head to the tip of wings) of $^{9}/_{16}$ in. when in a resting position (Fig. 2A) (Acevedo et al., 1972; Hoddle, 2013). Overall coloration is light tan and the forewings have numerous black spots, forming a ‘C’ shape at the distal part of the wing (indicated by arrow in Fig. 2B) (Cervantes et al., 1999; Royals et al., 2016).

Adults are nocturnal, flying short distances or resting on vegetation under host trees (Cervantes et al., 1999; Hoddle and Parra, 2013; Vázquez et al., 2017). During the day they hide in leaf litter and weeds (Acevedo et al., 1972; Cervantes et al., 1999; Hohmann and Meneguim, 1993).

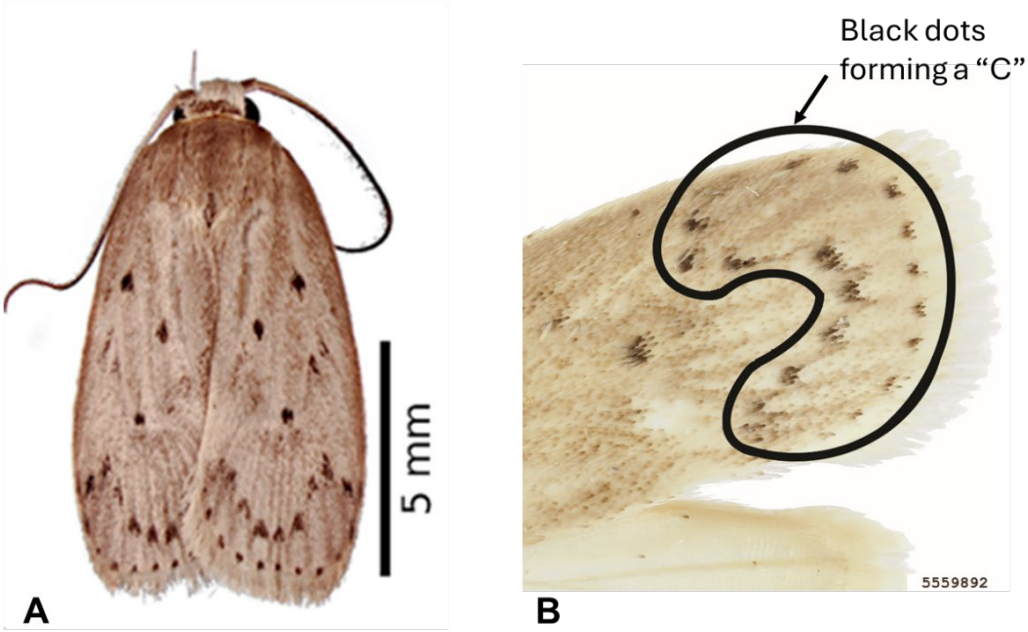

Figure 2. *Stenoma catenifer* moth in resting position **(A)** and a closeup of the forewing showing the black dots that form a “C” shape at the distal end of the wing **(B)**. Photo credits: (A) and (B) Hanna Royals, Screening Aids, USDA-APHIS-PPQ, Bugwood.org; CC BY-NC 3.0 US.

Eggs

Surveyors should not expect to identify *S. catenifer* from eggs found in the field. Eggs are oval, 0.6 mm long by 0.4 mm in diameter (Acevedo et al., 1972; Cervantes et al., 1999). They are initially pale green and turn creamy white as they develop (Cervantes et al., 1999). Females typically lay eggs on rough surfaces (Fig. 3A) like the pedicel/stem where the fruit attaches to the tree but mostly on the fruit surface, particularly on existing necrotic spots, although they can also lay on healthy fruits (Hoddle, 2013; Hohmann et al., 2003).

Larvae

First instar larvae are less than 1 mm long (Fig. 3B); mature larvae are up to ¾ in. long (Acevedo et al., 1972; Cervantes et al., 1999; Hoddle, 2013). Larvae are violet on their back transitioning to blue-green on their belly (Fig. 3C and D) (Acevedo et al., 1972; Cervantes et al., 1999). After hatching, larvae bore into fruit and are typically found in the seed or the pulp (Hoddle, 2013). Occasionally, larvae may tunnel into twigs and branches (Wolfenbarger and Colburn, 1979).

Pupae

Pupae are $^{1}/_{4}$-$^{3}/_{8}$ in. long (Acevedo et al., 1972; Cervantes et al., 1999). They are initially turquoise blue but turn reddish-brown (Fig. 4A&B) (Hoddle, 2013). Larvae usually pupate in soil or leaflitter at a depth of ~$^{1}/_{2}$ in. but occasionally they pupate within fallen fruits on the ground (Acevedo et al., 1972; Cervantes et al., 1999).

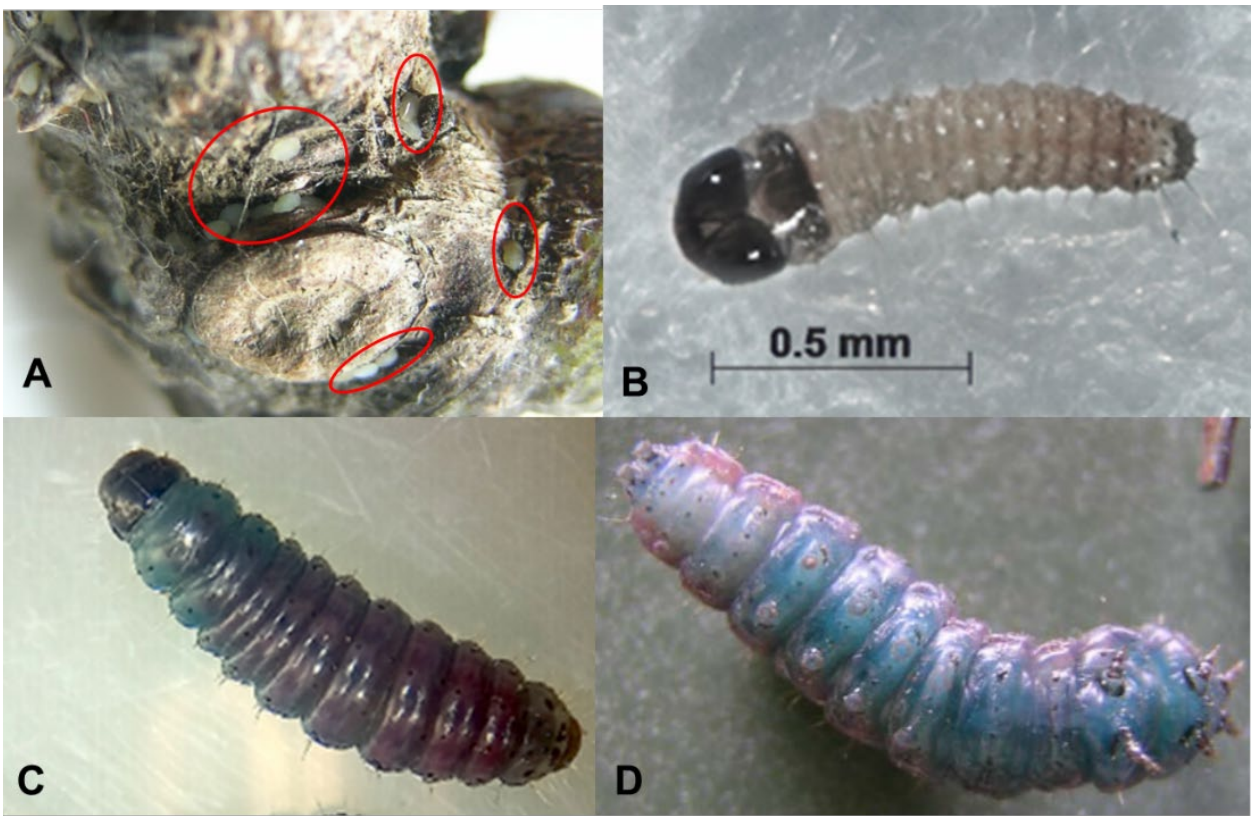

Figure 3. *Stenoma catenifer* immature stages: eggs **(A)**, first instar larva **(B)**, larva in dorsal view **(C),** and larva in ventral view (**D).** Photo credits: (A, C, D) Mark Hoddle, Department of Entomology, University of California Riverside and (B) Guadalupe Velázquez-Martinez and José Martinez, Colegio de Postgraduados.

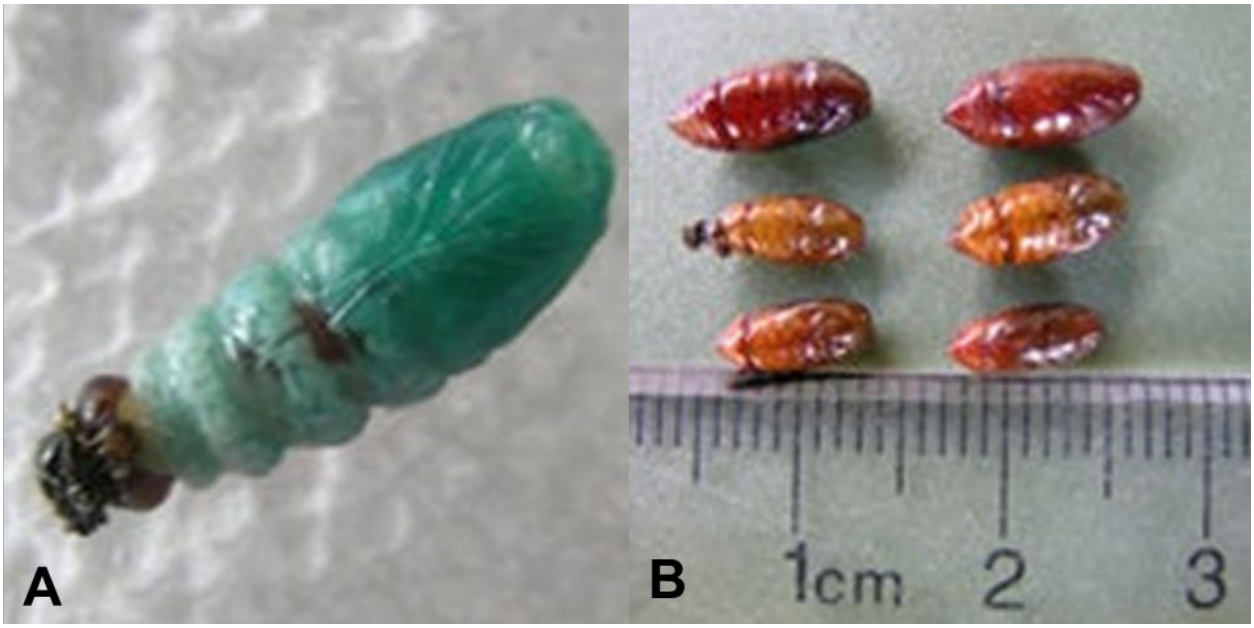

Figure 4. *Stenoma catenifer* recently molted turquoise blue pupa **(A)** and mature reddish-brown pupae **(B)**. Photo credit: Mark Hoddle, Department of Entomology, University of California Riverside.

Signs

Stenoma catenifer damages both young and mature avocadoes, typically targeting fruits in the upper half of the trees (Hohmann et al., 2003; Ventura et al., 1999). Within the fruit, damage is concentrated in the lower half (Hohmann et al., 2003; Ventura et al., 1999). Additionally, larvae can tunnel into the small terminal stem/twigs of young trees or into stems that have been pruned, causing dieback (Fig. 7) (Hoddle and Hoddle, 2012; Wolfenbarger and Colburn, 1979).

Signs of fruit infestation include:

- Larval entrance holes in the fruit, the size of a pinhole (Hohmann et al., 2003; Zapata et al., 2025).
- Whitish exudates running down the sides of the fruit (Fig. 5A) (Hoddle, 2013).
- Accumulated brown frass expelled through the entry hole (Fig. 5B) (Carabalí M. et al., 2021; Hoddle, 2013).
- Premature fruit drop of young or mature fruit (Acevedo et al., 1972; Murgas et al., 2018).
- Brown frass, tunneling, and total seed destruction in cut fruit (Fig. 6A&B) (Hoddle, 2013).

Figure 5. *Stenoma catenifer* damage signs observed from the fruit outside **(A)** Whitish exudates **(B)** frass and the rest of the feeding expelled **(C)** hole in fruits indicated by arrows. Photo credits: Mark Hoddle, Department of Entomology, University of California Riverside.

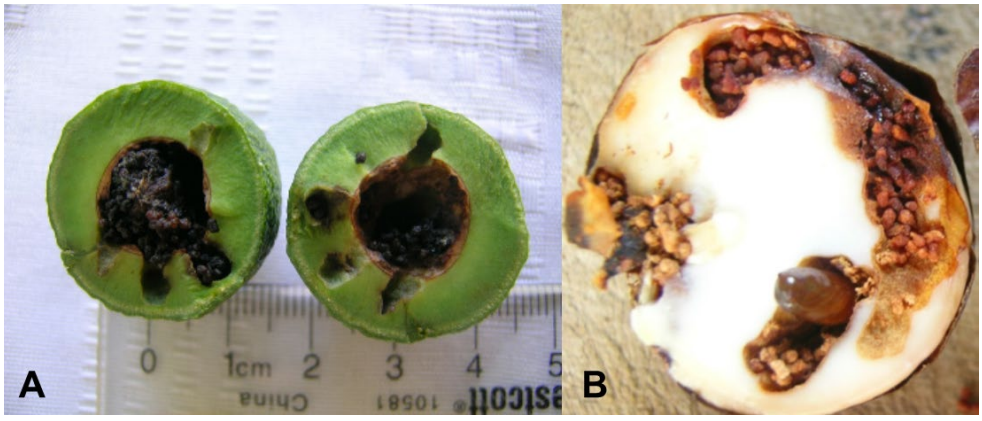

Figure 6. *Stenoma catenifer* damage, including galleries in the pulp and seed **(A)** and galleries, frass, and a pupa within a seed **(B)**. Photo credits: Mark Hoddle, Department of Entomology, University of California Riverside.

Figure 7. *Stenoma catenifer* larva feeding within an avocado stem. Photo credit: Mark Hoddle, Department of Entomology, University of California Riverside.

Easily Mistaken Species

Stenoma catenifer closely resembles other members of the Depressariidae family or moths from the superfamily Gelechioidea. Because of its small size, a trained Lepidopterist is required to screen and identify this moth (Royals et al., 2016). Refer to the *Stenoma catenifer* Screening Aid for more information and figures.

The moths most likely to be mistaken for *S. catenifer* are other members of the Depressariidae (Royals et al., 2016). Of these, *Antaeotricha* spp. are the most commonly encountered in surveys for *S. catenifer* in other countries (Fig. 8) (Royals et al., 2016). *Antaeotricha* spp. are present in the U.S. and can be distinguished from *S. catenifer* by their bright white wings with gray and black markings that resemble bird droppings (Royals et al., 2016). Some *Antaeotricha* spp. present in North America use *Quercus* (oak) as their larval hosts, but the hosts of many species are unknown (Ferris, 2013).

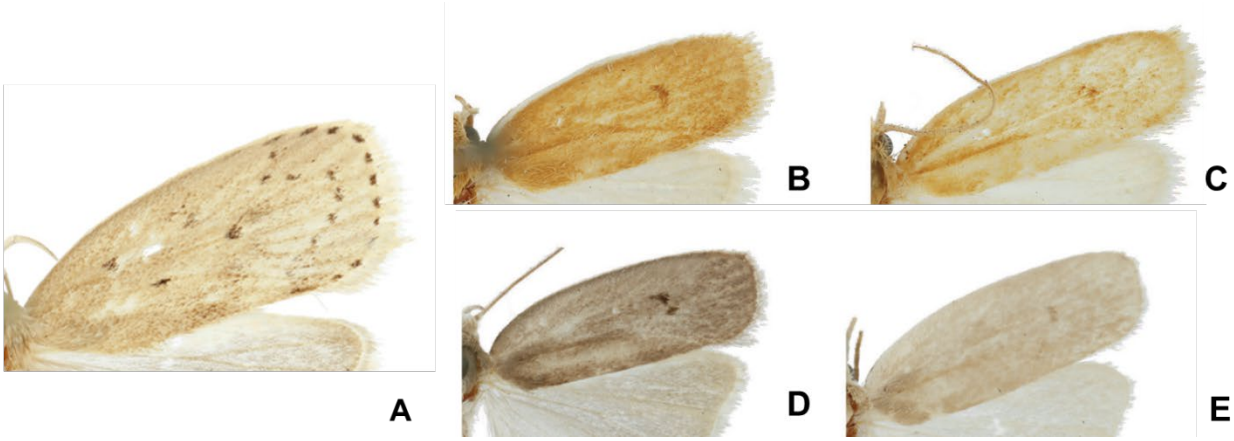

Figure 8. The right forewing of *S. catenifer* and two easily mistaken species of *Antaeotricha*. *Stenoma catenifer* **(A)**, *Antaeotricha unipunctella* with different wing patterns **(B, C)** *Antaeotricha osseella* with different wing patterns **(D, E)**. Photo credits: Hanna Royals, Screening Aids, USDA- APHIS- PPQ, Bugwood.org; CC BY-NC 3.0 US.

Amorbia concavana (Tortricidae) is another moth that is caught in surveys for *S. catenifer* and looks superficially similar (Brambila, 2017). *Amorbia concavana* is of similar size to *S. catenifer* but can be distinguished by the scattered black scales in the front wings (Fig. 9), that do not form a "C" shape at the distal part (Hayden, 2012). This moth is widely present in the southernmost part of Florida and is a polyphagous insect that prefers plants within the Fabaceae family (Hayden, 2012; Phillips-Rodriguez and Powell, 2007).

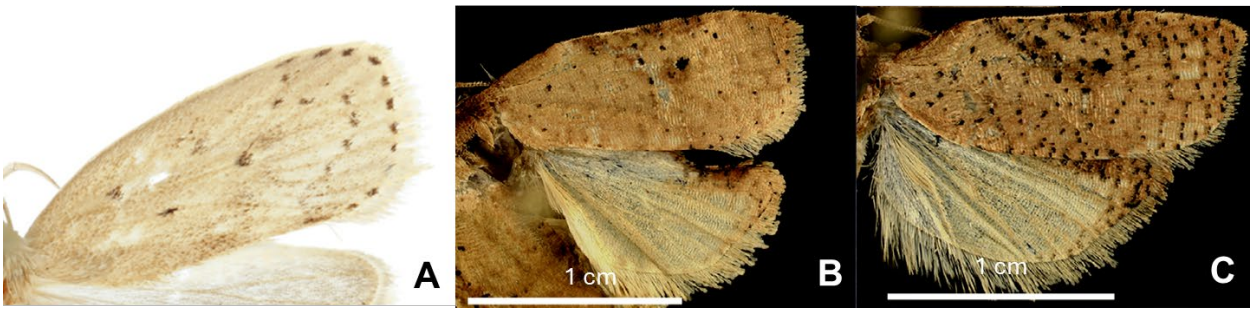

Figure 9. *Stenoma catenifer* mistaken species, right forewing: *Stenoma catenifer* **(A)**, *Amorbia concavana* male **(B)**, and *A. concavana* male showing different black scale pattern **(C)**. Photo credits: (A) Hanna Royals, Screening Aids, USDA- APHIS- PPQ, Bugwood.org; CC BY-NC 3.0 US; (B) and (C) James E. Hayden, Division of Plant Industry, Entomology Section, Lepidoptera - Florida Department of Agriculture and Consumer Services.

Commonly Encountered Non-targets

The approved survey method for *S. catenifer* is wing traps loaded with *Stenoma catenifer* lure ((9Z)-9,13-tetradecadien-11-ynal). There are no species listed in the Pherobase database that are attracted to this lure (El-Sayed, 2025). However, in an avocado survey in Florida exploring common non-target species attracted to *S. catenifer* traps, *Amorbia concavana* (Tortricidae) and *Dryadaula terpsichorella* (Dryadaulidae) were both captured (Brambila, 2017).

Additionally, *Antaeotricha nictitans* was caught in traps loaded with *S. catenifer* lure in Mexico and Guatemala (Castillo et al., 2012; Hoddle et al., 2011). Multiple groups of insects have been captured in this trap in Guatemala, with the genus *Ecdytolopha* (Lepidoptera: Tortricidae) being the most frequent non-target (Arévalo Guerra and Cano, 2019). Multiple species of *Ecdytolopha* are common in the United States (Austin et al., 2025) so this genus may be a common non-target in traps.

Finally, the easily mistaken moth species mentioned in the previous section (primarily moths in the Depressariidae family) may be found in traps. It is unclear which of these moths are attracted to the *S. catenifer* lure, but the frequent capture of *A. nictitans* suggests that *S. catenifer* sex pheromones may have some activity across a wide range of related species (Hoddle et al., 2011). Species present in the United States include *Agonopterix canadensis, A. costimacula, A. pulvipennella, A. robiniella, Antaeotricha osseella, A. unipunctella,* and *Gonioterma mistrella* (Moth Photographers Group, 2025; Royals et al., 2016).

Biology and Ecology

Moths are observed in the field during the avocado flowering and fruiting season, which varies based on geographic location and cultivar (Vacari et al., 2021; Vázquez et al., 2017). In Mexico, two population peaks per year are observed in the field (Velázquez-Martínez et al., 2022), but up to eight generations are predicted to be possible (Nava et al., 2005).

Females lay eggs singly on the skins of young and mature fruits, on branches attached to the fruit, and on flower stalks, mainly in the upper half of the tree canopy (Acevedo et al., 1972; Hohmann et al., 2003; Ventura et al., 1999). The egg hatches in about 4–10 days and the larva bores into the fruit (Acevedo et al., 1972; Hohmann et al., 2003; Nava et al., 2005). Larvae primarily feed on the avocado fruit and pit, and occasionally tunnel into twigs and stems of host trees (Carabalí M. et al., 2021; Cervantes et al., 1999; Hoddle, 2013).Typically, one or two larvae feed inside the fruit, but up to four larvae per fruit can occur (Hoddle, 2013). The larva completes five instars inside the fruit, where it feeds and makes galleries in the pulp to reach the seed (Acevedo et al., 1972; Hoddle, 2013). The larva feeds in the avocado for 20–40 days before pupating (Nava et al., 2005).

Larvae typically leave the fruit to pupate in the leaflitter or soil at a depth of ~$^1/_2$ inches. If larvae cause the avocado to drop prematurely, pupation can occur inside fallen fruit or in the seed (Acevedo et al., 1972; Cervantes et al., 1999). The pupa develops for 8–20 days before the adult emerges (Nava et al., 2005).

Adults are active at night (Acevedo et al., 1972; Cervantes et al., 1999). Female moths emit pheromones that attract males, with optimal flight conditions occurring above 60°F and above 60% relative humidity. Peak flight activity has been observed between 64°F and 72°F and weekly relative humidity greater than 80% (Velázquez-Martínez et al., 2022). Moths begin mating within 2–3 days after emerging and females oviposit shortly thereafter (Acevedo et al., 1972; Cervantes et al., 1999). Females can lay up to 240 eggs in their lifetime (Acevedo et al., 1972). Under laboratory conditions, moths live for 5–17 days and the *S. catenifer* life cycle takes 37–49 days (Acevedo et al., 1972; Cervantes et al., 1999; Hohmann and Meneguim, 1993; Nava and Parra, 2005). *Stenoma catenifer* requires 645 degree-days to complete one generation with a base temperature (lower threshold below which they do not develop) of 48°F (Nava et al., 2005).

Pathogens or Associated Organisms Vectored

Stenoma catenifer is not known to be a vector of, or associate with, any pathogens or other organisms.

Known Hosts

The host list below includes cultivated and wild plants that 1) are infected or infested by the pest under natural conditions, 2) are frequently described as major, primary, or preferred hosts, and 3) have primary evidence for feeding and damage documented in the literature. Plants are highlighted in bold if they are commercially produced and the pest causes economically significant damage.

Stenoma catenifer only infests plants within the Lauraceae family (Cervantes et al., 1999). **Avocado (*Persea americana**)** is the preferred and most commercially important host of this moth (Hoddle, 2013). Other hosts include greenheart-tree (*Chlorocardium rodiei),* camphor tree (*Cinnamomum camphora*), Damburneya ambigens*, *D. salicifolia*, *Nectandra angustifolia* (= *N. megapotamica*), shinglewood (*N. hihua**), *N. turbacensis**, and *Persea schiedeana* (coyo or chinina avocado) (Cervantes et al., 1999; Hernández, 2022; Link and Link, 2008; Rodríguez-Sánchez et al., 2022; Sanhueza-Peñaranda et al., 2025), but these are minor hosts and should not be considered for survey. *Beilschmiedia* sp. is mentioned in various references, but we could not locate direct evidence of the pest infesting this host.
*Presence in the U.S. or its territories confirmed by (USDA-NRCS, 2025)

Known Distribution

Stenoma catenifer is native to the neotropical region, where it is present from central Mexico through Central America and into central South America (Hoddle, 2013; Palacios Torres et al., 2011). It was introduced from mainland Ecuador into the Galapagos Islands, where it is now established on at least two islands (Hoddle, 2013; Landry and Roque, 2003).

Table 3. Countries where *S. catenifer* is known to occur.

Continent	Country	References/Notes
North America	Mexico	(Palacios Torres et al., 2011)
Central America	Costa Rica	(Mora-Montero, 1997)
Central America	El Salvador	(Wolfenberger and Colburn, 1966)
Central America	Guatemala	(Arévalo Guerra and Cano, 2019)
Central America	Honduras	(Miller et al., 2012)
Central America	Nicaragua	(Jimenez, 2022)
Central America	Panama	(Murgas et al., 2018)
South America	Brazil	(Nava and Parra, 2005)
South America	Colombia	(Manrique et al., 2014)
South America	Ecuador	(Hoddle, 2013)
South America	Guyana	(Cervantes et al., 1999)
South America	Peru	(Arellano, 1998; Hoddle and Hoddle, 2012)
South America	Venezuela	(Boscán de Martínez and Godoy, 1984)

Argentina is mentioned in multiple references, but the Argentinian NPPO has stated that *S. catenifer* is absent from its territories (EPPO, 2024). Miscellaneous reports mention the pest's presence in Belize and French Guyana (EPPO, 2025; Hoddle and Parra, 2013), but we could not locate direct evidence of the pest in this country.

Pest Importance

Stenoma catenifer is considered one of the most damaging avocado pests in many tropical and subtropical areas (Ebeling, 1959; Hoddle and Parra, 2013). The larvae can

cause enough damage to result in complete fruit production loss (Hoddle, 2013; Wolfenberger and Colburn, 1966).

In avocado-producing and exporting countries, *S. catenifer* still causes significant damage in some areas (Hoddle and Parra, 2013). In Brazil, *S. catenifer* is regarded as a limiting factor to avocado production in many states and is the cause for a restriction on export markets (Hohmann et al., 2003; Vacari et al., 2021). In Colombia, losses attributed to *S. catenifer* can range from 10 to 50% (Londoño et al., 2020; Velázquez-Martínez et al., 2022). In some orchards in Panama and Mexico that are not certified for exportation, fruit infestations can range up to 40 and 65%, respectively (Murgas et al., 2018; Velázquez-Martínez et al., 2022).

Cervantes et al. (1999) report *S. catenifer* infesting fruits of the greenheart-tree, *Chlorocardium rodiei,* a wild tree of economic importance (for timber) in Guyana, although with a lower infestation rate than avocado.

Avocado is an important crop in the United States, cultivated in California, Florida, and Hawaii on over 52,000 acres, with California representing about 90% of national production during 2023-2024 (NASS, 2024). The avocado market value in 2018 was estimated at about $400 million (NASS, 2019).

Stenoma catenifer is listed as a harmful organism in New Caledonia and Japan (USDA-PCIT, 2025). Trade implications may arise with these countries if this pest establishes in the United States.

Pathway

Stenoma catenifer can move to new areas as larvae in the fruit through the avocado trade and human-mediated movement. Agricultural inspectors at U.S. ports of entry have intercepted infested fruit and seed numerous times in luggage and mail from several countries (USDA-APHIS-PPQ, 2013; USDA-APHIS, 1979). *Stenoma catenifer* was introduced to the Galapagos Islands from mainland Ecuador through infested fruits (Hoddle, 2013; Landry and Roque, 2003). The pest can also move through the movement of avocado plants, as the larvae feed inside branches, stems, and twigs (Wolfenbarger and Colburn, 1979).

Adult moths typically fly short distances, but in field experiments, males were able to disperse up to 200 feet in one night (Hoddle et al., 2011).

Use the **Agricultural Commodity Import Requirements(ACIR) manual** 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 requirements are updated regularly.

Potential Distribution within the United States

Based on the known distribution of *S. catenifer* and comparing those climates to Global Plant Hardiness Zones (Takeuchi et al., 2018) we expect that *S. catenifer* could establish in plant hardiness zones 9-14. SAFARIS developed a Likelihood of Establishment map for *S. catenifer* indicating that Hawaii, Puerto Rico, the U.S. Virgin Islands, and parts of the continental United States have suitable conditions for permanent establishment (SAFARIS, 2025). However, due to its host requirements, only avocado-growing states are at risk for *S. catenifer* establishment, which includes California, Florida, Hawaii and Puerto Rico (CAC, 2025; Crane et al., 2019; NASS, 2024). The total combined avocado growing area in the states of California, Florida, and Hawaii is 52,000 acres (NASS, 2024).

For California and Hawaii, 4-8 generations per year are predicted, while 7-9 are possible in Florida and Puerto Rico (SAFARIS, 2025).

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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USDA-APHIS-PPQ-ST staff developed this datasheet. Cite this document as:

PPQ. 2025. Cooperative Agricultural Pest Survey (CAPS) Pest Datasheet for *Stenoma catenifer* Walsingham, 1912 (Depressariidae): Avocado seed moth. United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine (PPQ), Raleigh, NC.

Versions

February 2016: Datasheet completed (Version 1)

November 2025 (Version 2)
- Created **Pest Recognition** section
- Added **Easily Mistaken Species** section
- Added **Commonly Encountered Non-targets** section
- Updated **Biology & Ecology** section
- Created tables for **preferred and other Known hosts** section
- Updated **Pest Importance** section with economic losses in various countries.
- Created a table for **Known Distribution** section
- Updated **Pathway** section
- Updated **Potential Distribution within the United States** section
- Updated guidance for **Approved Methods** section

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