

TortAI

TORTRICIDS OF AGRICULTURAL IMPORTANCE

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CPHST's Identification Technology Program (ITP) is pleased to announce the release of its latest identification tool, *Tortricids of Agricultural Importance (TortAI)*. The family Tortricidae contains approximately 9,800 species, many of which are considered serious pests. *TortAI* is designed to aid in the identification of tortricid adults encountered during domestic surveys and tortricid larvae encountered during quarantine inspections at U.S. ports of entry. This tool includes interactive identification keys, detailed fact sheets, an illustrated glossary, information on dissecting and preparing specimens, identification thumbnail galleries, and a database of DNA barcode sequences.

TortAI was developed and published by the Center for Plant Health Science and Technology (CPHST) as part of a cooperative agreement with Colorado State University and in collaboration with the California Department of Food and Agriculture (CDFA).

idtools.org/id/leps/tortai/

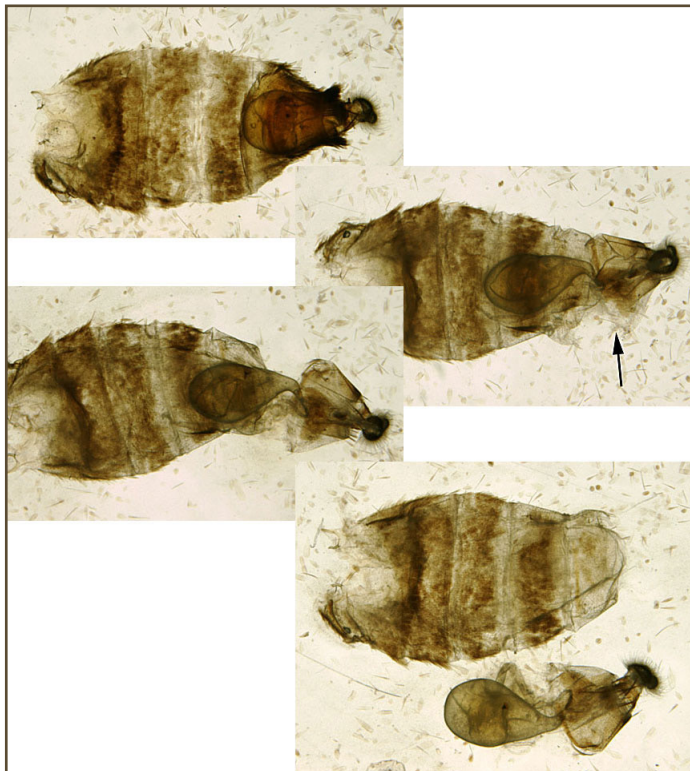


United States agriculture is constantly threatened by invasive species. Crop losses in the U.S. due to introduced insect pests are estimated to exceed \$14 billion USD annually, and many of these pests are Lepidoptera. Worldwide, Tortricidae contains close to 700 economically important species, a number that is third only to the Noctuidae and Pyraloidea. Identification of tortricid pests can be difficult, and the availability of diagnostic resources prior to an invasion is essential for responding in a timely and appropriate manner to new introductions. *TortAI* allows identifiers to reliably eliminate or confirm target (pest) taxa if or when they are encountered at U.S. ports of entry or during domestic surveys performed under the Cooperative Agricultural Pest Survey (CAPS) program.

TortAI includes detailed fact sheets on tortricid pests as well as non-targets. More than 125 taxa (tribes, genera, or species) are treated. All fact sheets contain numerous photographs of adult wing patterns, male and female genitalia, and larvae. A section on adult recognition lists diagnostic characters for identifying adults, and a larval morphology section describes the larvae. A detailed life history description, along with a list of host plants is included in the biology section. Distribution data for each species and a set of references complete the fact sheet.

Two interactive keys are included in *TortAI*. The adult key treats 98 taxa that are likely to be encountered during domestic CAPS surveys. Taxa are divided into primary targets, secondary targets, and non-targets. Identification is performed using primarily forewing pattern and male genitalia, although other diagnostic characters for the head, hindwings, and female genitalia are also included. The larval key treats 50 taxa that are most commonly intercepted during quarantine surveys by the USDA at U.S. ports of entry. Taxa can be restricted by origin (geographic location) and host, and many times this information is necessary to obtain a successful determination. Identification is performed using a variety of morphological characters in conjunction with the origin and host data.

It is not always possible to identify tortricid larvae using only morphological characters. A molecular sequence search tool is provided to allow identifiers with sequencing capabilities the ability to confirm DNA barcode sequences of tortricid larvae. The tool searches for an exact match between the



Screenshots from the female genitalia dissection tutorial showing steps 2-5 out of 12

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Cacoecimorpha pronubana

CAPS Secondary Target - Adult
Port Interception Target - Larva

Cacoecimorpha pronubana (Hubner) (Tortricidae: Tortricinae: Archipini)

Common names: carnation tortrix, European carnation moth

Synonyms: *ambustana* (Tortrix), *hermineana* (Tortrix), *insolatana* (Tortrix), *perochreana* (Tortrix)

Fig. 1: Male

Fig. 2: Male

Fig. 3: Male

Fig. 4: Female

Fig. 5: Female

Fig. 6: Male genitalia

Fig. 7: Female genitalia

Fig. 8: Resting adult

Fig. 9: Larva

Fig. 10: Prothoracic shield markings

Adult Recognition

FWL: 6.5-8.5 mm (male); 7.5-11.5 mm (female)

Forewings are orangish brown to dark brown. A dark-brown median fascia is usually expressed in males while females are lighter with dark reticulations. The hindwings in both sexes are a distinctive bright orange and black, although many females lack black scaling on the hindwings. Males lack a forewing costal fold.

Males fly during the day or early evening and have been observed "swarming" around sources of the female pheromone, sometimes in large numbers. Males have been captured in pheromone traps using pheromones

Detailed fact sheets provide information for all taxa included in *TortAI*.

input sequence and the reference database, which contains more than 800 COI haplotypes of over 300 target and non-target species from around the world.

TortAI features a wealth of other resources to help support identification of this important group of pests. There's a richly illustrated glossary of morphological terms and a set of identification thumbnail photos that can be used to quickly compare wing patterns. Illustrated dissection and slide-making tutorials are included for less experienced users, with instructions for both male and female specimens. Links for numerous publications, screening aids, and references related to tortricid pests are also provided.

TortAI is available via the web at idtools.org/id/leps/tortai/, or on CD-ROM. To request a copy on CD-ROM, please send your mailing address and plans for use to Christina Southwick (email christina.southwick@aphis.usda.gov).

For more information about other CPHST identification resources and tools for plant protection and quarantine, contact Amanda Redford (amanda.j.redford@aphis.usda.gov). To provide feedback on *TortAI*, contact Todd Gilligan (todd.gilligan@colostate.edu). To find other identification aids for tortricids, visit ID Source - Tortricidae. To view other identification tools developed by the CPHST ITP team, visit ID Source - ITP.