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Field survey guidance for *Thaumatotibia leucotreta*

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Contents

Figures

Introduction

This survey guidance provides easy-to-follow guidelines for technical personnel of national plant protection organizations (NPPOs) to survey for *Thaumatotibia leucotreta*, a major plant pest commonly known as False codling moth.

Active and regular monitoring and surveillance are critical for countries to establish the presence or absence of plant pests, especially those with severe impacts on food security, the environment, trade, and agricultural productivity. This early warning information is crucial for rapid response, making sound phytosanitary decisions, effectively managing risks, and controlling and protecting borders against pest entry.

This survey guidance provides a protocol to aid in the monitoring, detection, sample collection and identification of *Thaumatotibia leucotreta*, ensuring effective phytosanitary decision-making to manage pest risk and protect trade in plants and plant products. This document also provides visuals and guidance on recommenced pest trapping.

This survey guidance complements the digital tools available to NPPO plant health inspectors, through the Africa Phytosanitary Programme (APP) mobile application and Geographic Information System (GIS) platforms.

APP is an initiative of the International Plant Protection Convention (IPPC) designed to transform pest management across Africa by enhancing the capabilities of phytosanitary personnel within NPPOs, to leverage advanced science and modern digital technology for effective and timely pest surveillance, detection, identification, control, and prevention. APP aims to strengthen the resilience of Africa's phytosanitary systems against plant pests of regulatory, economic and environmental significance. Some of the countries involved in APP listed *Thaumatotibia leucotreta*, as a priority pest in their countries, requiring effective surveillance.

The IPPC implements APP in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and the African Union Department of Agriculture, Rural Development, Blue Economy and Sustainable Development, through the African Union Inter-Africa Phytosanitary Council (AU-IAPSC).

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Acknowledgements

This document presents guidance to national plant protection organizations (NPPOs) to support active surveillance, detection, identification, control and prevention of *Thaumatotibia leucotreta*. This document was created with financial support from the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS). The guidance provided in this document was prepared by subject matter experts from USDA APHIS and reviewed by technical officers at the IPPC Secretariat, in the framework of the Africa Phytosanitary Programme (APP). The IPPC implements APP in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and the African Union Commission on Agriculture, through its technical unit- the African Union Inter-Africa Phytosanitary Council (AU-IAPSC). The IPPC Secretariat and the IPPC community are grateful to all the institutions that contributed to the production of this technical resource.

Abbreviations

APHIS	Animal and Plant Health Inspection Service
APP	Africa Phytosanitary Programme
AU-IAPSC	African Union Inter-Africa Phytosanitary Council
GIS	Geographic Information System
IPPC	International Plant Protection Convention
NPPO	National Plant Protection Organization
WSDA	Washington State Department of Agriculture
USDA	United States Department of Agriculture

Figure 1. *Thaumatotibia leucotreta*, adult male. *© T.M. Gilligan and M.E. Epstein, Tortricids of Agricultural Importance (TortAI), USDA-APHIS-PPQ, Bugwood.org*

Survey guidance for *Thaumatotibia leucotreta*

Scientific name

Thaumatotibia leucotreta (Meyrick).

Common name

False codling moth, citrus codling moth, orange moth, orange codling moth.

Type of pest

Moth, borer.

Taxonomic position

Class: Insecta
Order: Lepidoptera
Family: Tortricidae

Notes on taxonomy and nomenclature:
This species was previously known as *Cryptophlebia leucotreta* (Meyrick)

Known Hosts

False codling moth is a generalist feeder and has been recorded feeding on over 50 different plant species, which allows the moth to survive in marginal conditions

Preferred hosts

Peppers (*Capsicum* spp.), citrus (*Citrus* spp.), cotton (*Gossypium* spp.), litchi (*Litchi chinensis*), macadamia (*Macadamia* spp.), avocado (*Persea americana*), peach (*Prunus persica*), pomegranate (*Punica granatum*), castor bean (*Ricinus communis*) and maize (*Zea mays*).

Other hosts

Other hosts are numerous, some of which include: *Abutilon* spp., *Albuca* spp., *Annona* spp., *Asparagus crassicladus, Averrhoa carambola, Bauhinia galpini, Calotropis procera, Capparis tomentosa, Catha edulis, Chrysophyllum cainito, Cola nitida, Diospyros*

mespiliformis, Diospyros pallens, Englerophytum magalismontanum, Eriobotrya japonica, Eugenia uniflora, Ficus sur, Flacourtia indica, Garcinia mangostana, Harpephyllum caffrum, Hibiscus spp., *Mimusops zeyheri, Musa × paradisiaca, Olea* spp., *Opuntia ficus-indica, Passiflora spp., Phaseolus* spp., *Physalis* spp., *Piper* spp., *Psidium guajava, Podocarpus* spp., *Prunus* spp., *Pseudolachnostylis maprouneifolia, Rosa* spp., *Saccharum officinarum, Schotia* spp., *Sechium edule, Senna petersiana, Sida* spp., *Solanum betaceum, Solanum melongena, Synsepalum dulcificum, Syzygium cordatum, Syzygium jambos, Theobroma cacao, Thespesia garckeana, Vachellia* spp., *Vigna* spp., *Vitellaria paradoxa, Vitis* spp., *Xeroderris stuhlmannii, Ximenia caffra, Yucca* spp. *and Ziziphus* spp.

Figure 2. *Thaumatotibia leucotreta* larva. *© Kenneth R. Law, USDA-APHIS-PPQ, Bugwood.org*

Survey protocol

Target life stage

The approved survey method is pheromone trapping for adult males.

Survey-site selection

Surveys should focus on areas that have abundant host material.
This can be in agricultural settings, nursery settings or around ports of entry.

Time of year to survey

Surveys should occur when fruiting of the host plants begins. Surveys are best conducted during warm, wet weather when the population of the pest increases.

Visual survey

Signs and symptoms

False codling moth larvae feed inside fruits (Figure 2). Larval feeding and development can affect fruit or cotton boll development and can cause rotting.

Trapping

Recommended traps

Use either wing traps, diamond traps or large plastic delta traps, baited with false codling moth lure, dispensed from a rubber septum. It is preferable to use wing traps or large plastic delta traps to standardize data.

Recommended lures

The lure is composed of E8-12Ac and Z8-12Ac.

Trap placement and spacing

Traps should be placed at least 1.5 m high. When trapping for more than one species of moth, separate traps for different moth species by at least 20 m.
IMPORTANT: Do not include lures for other target species in the trap when trapping for false codling moth.

Trap servicing

The lure is effective for 56 days.

Pest identification and diagnostics

The approved diagnostic method is morphological identification. The nearly circular pocket of scales in the hind wing of males is not found in any other tortricid species known to occur in Africa, Europe or North America (Figure 3).

Pest description

Adult false codling moths (*Thaumatotibia leucotreta*) are greyish brown to dark brown with a 6 mm–8 mm body and forewing length of 7 mm–8 mm in males and 9 mm–10 mm in females; females have a wingspan of 15 mm–20 mm and males have a wingspan of 15 mm–18 mm. Male false codling moths can be distinguished from other tortricid species by the pocket of multicoloured scales near the bottom edge of the hindwing (hindwing scale pocket) (Figure 3). The hindwing scale pocket can be seen on moths in sticky traps by moving the forewings out of the way with forceps or an insect pin. Additionally, the forewings have a scalloped line of black scales near the distal edge of the wing that has a break approximately two thirds of the distance from the forward edge. Just beyond the midpoint of the wing near the middle, there is a distinct white/cream-coloured spot (Figure 3). Suspect false codling moth in traps that need to be forwarded to another facility for identification should be packed following the steps outlined in Figure 4.

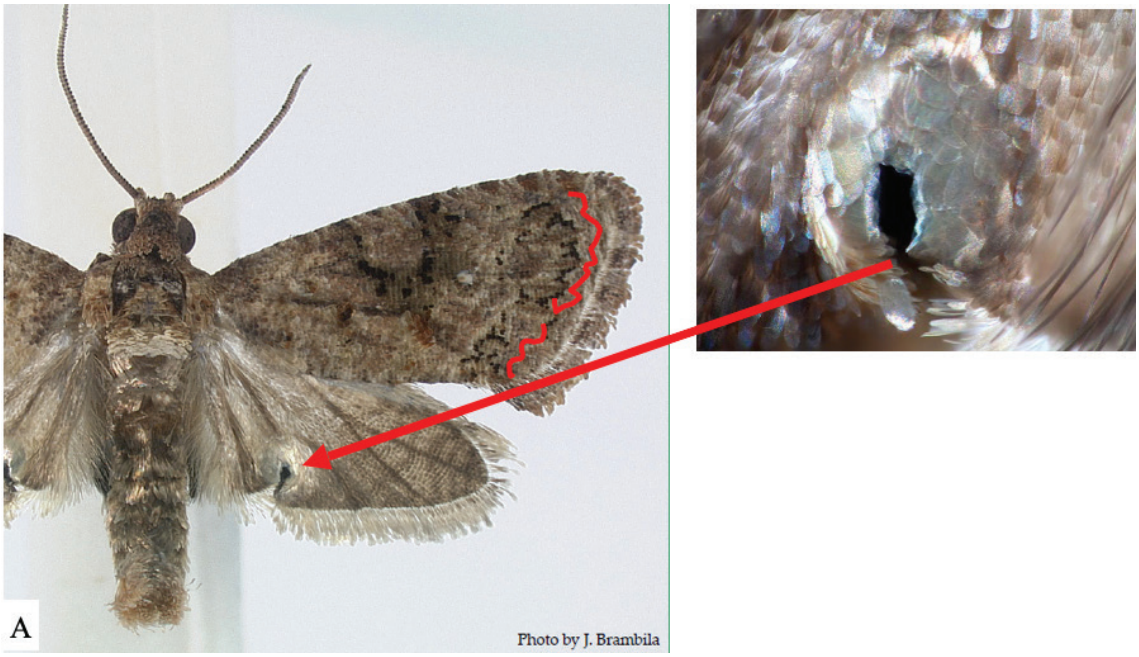

Figure 3. Important diagnostic features for male *T. leucotreta*: (a) wing pattern (red outline) and (b) hindwing scale pocket (red arrow). *© 3(a): J. Brambila; 3(b): T. Gilligan*

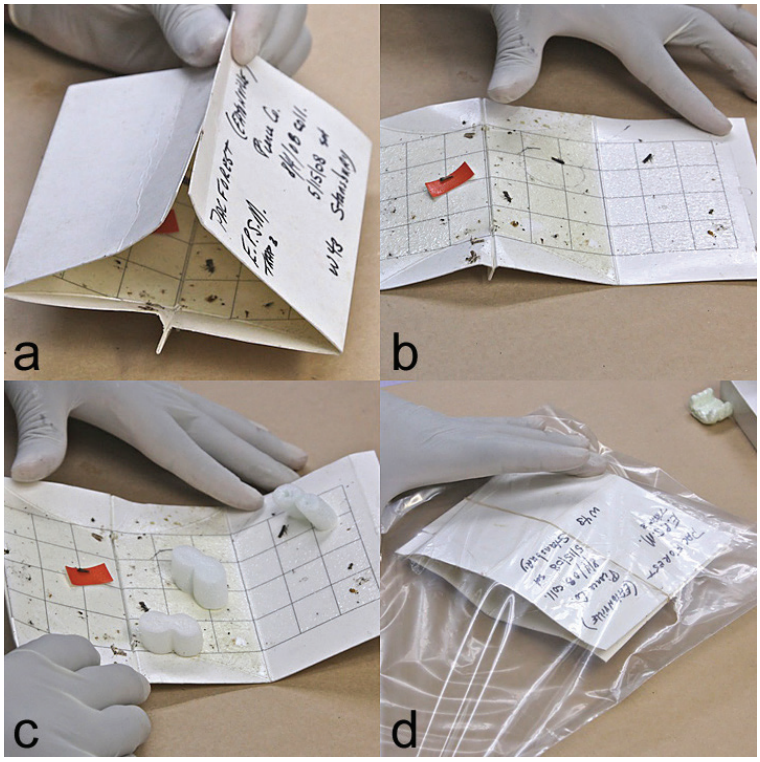

Figure 4. Recommended packing method for sticky traps: (a) and (b) open and unfold trap; (c) place two or three packing peanuts (or something similar) in areas of trap with no moths; (d) fold trap, secure with rubber band and place in plastic bag if the samples are dry, otherwise store or ship in a paper bag so that specimens can dry and do not rot. *©E. LaGasa, WSDA*

Identification and diagnostic resources

1. **Gilligan, T.M. & Epstein, M.E. 2014.** Screening aid: False codling moth, *Thaumatotibia leucotreta* (Meyrick). Identification Technology Program (ITP), USDA-APHIS-PPQ-S&T, 6 pp. Fort Collins, USA. [Cited 12 July 2024]. http://download.ceris.purdue.edu/file/2543
2. **Brambila, J.** 2011. *Thaumatotibia leucotreta*, False Codling Moth, Field Screening Aid. Cooperative Agriculture Pest Survey program, USDA-APHIS-PPQ. [Cited 12 July 2024]. http://download.ceris.purdue.edu/file/1575
3. **Floyd, J.** n.d. False Codling Moth Larval Identification Guide, *Thaumatotibia leucotreta* (Meyrick). National Identification Service, USDA-APHIS-PPQ, Riverdale, USA. [Cited 12 July 2024]. http://download.ceris.purdue.edu/file/544
4. **Brambila, J.** 2023. *Thaumatotibia leucotreta*, False Codling Moth, "FCM", Identification Aid. Cooperative Agriculture Pest Survey program, USDA-APHIS-PPQ. [Cited 12 July 2024]. http://download.ceris.purdue.edu/file/4426
5. **Gilligan, T.M. & Epstein, M.E.** 2014. Dissection and Slide-Making Techniques. In: *Tortricids of agricultural importance.* [Cited 12 July 2024]. https://idtools.org/id/leps/tortai/dissections.html

Easily mistaken species

False codling moth could be mistaken for *Cryptophlebia peltastica* (Meyrick) (Figure 5), *Mussidia nigrivenella* (Ragonot) (Figure 6) and *Thaumatotibia batrachopa* (Meyrick) (Figure 7), which occur in Africa. However, these moths lack the characteristic hindwing scale pocket found in male false codling moth.

Figure 5. *Cryptophlebia peltastica* adult. *© T.M. Gilligan and M.E. Epstein, Tortricids of Agricultural Importance TortAI, USDA-APHIS-PPQ, Bugwood.org*

Figure 6. *Mussidia nigrevenella*. *© CABI*

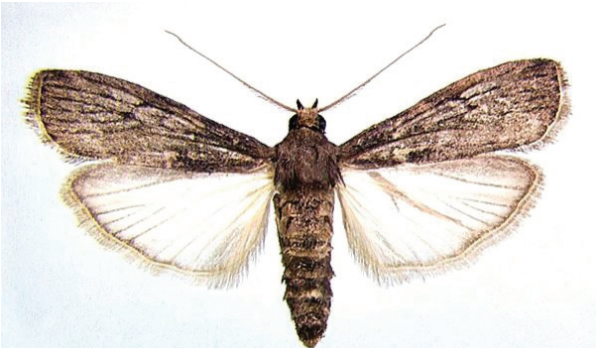

Figure 7. *Thaumatotibia batrachopa*. *© Carlos Lopez Vaamonde, Institut National de la Recherche Agronomique, Zoologie Forestière*

IPPC

The International Plant Protection Convention (IPPC) is an international plant-health agreement that aims to protect global plant resources and facilitate safe trade. The IPPC vision is that all countries have the capacity to implement harmonized measures to prevent pest introductions and spread, and minimize the impacts of pests on food security, trade, economic growth, and the environment.

Organization

- There are over 180 IPPC contracting parties.
- Each contracting party has a national plant protection organization (NPPO) and an official IPPC contact point.
- Ten regional plant protection organizations have been established to coordinate NPPOs in various regions of the world.
- The IPPC Secretariat liaises with relevant international organizations to help build regional and national capacities.
- The secretariat is provided by the Food and Agriculture Organization of the United Nations (FAO).

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