



Food and Agriculture
Organization of the
United Nations



International
Plant Protection
Convention

Africa Phytosanitary Programme



Development of Pest Survey Protocols

Arop Deng, IPPC Secretariat

(APP) Phase 2 · Train-the-Trainer workshop
23–27 June 2025 · Mpumalanga, South Africa

Co-organized by:



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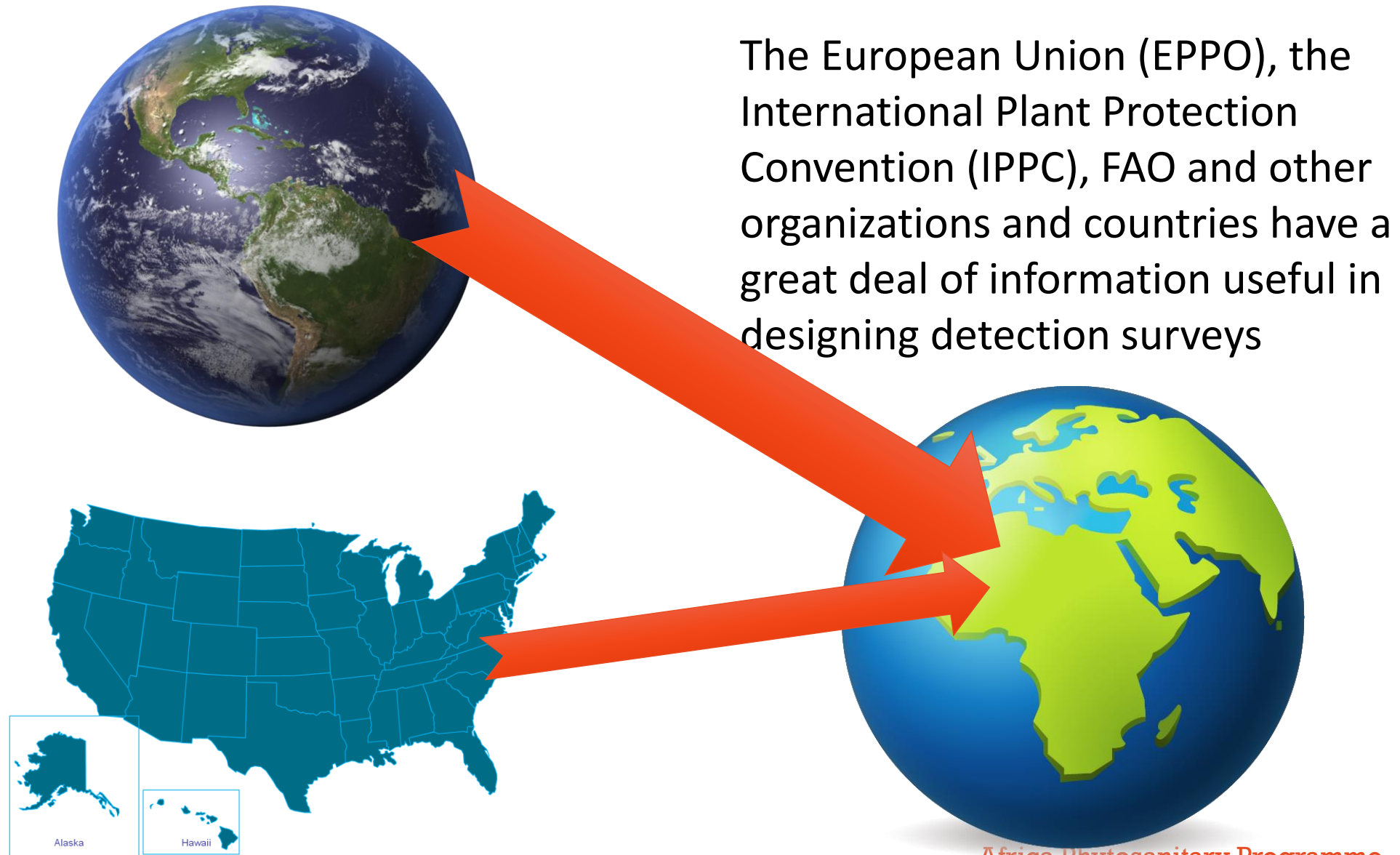
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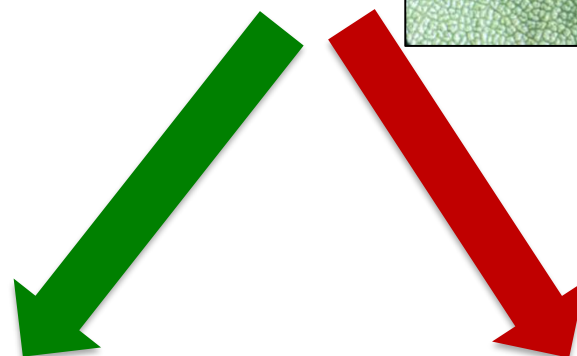
Plant Pest Risk Analysis Scientists- Raleigh, NC, USA



Developing a Pest Survey

- The purpose of this presentation is:
 - to tell you about how pest survey protocols are developed, and
 - present you with the **tools and resources available** to aid you in developing your own pest detection surveys in the future



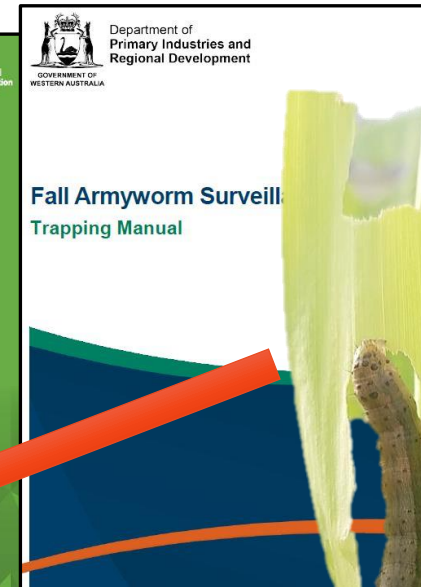
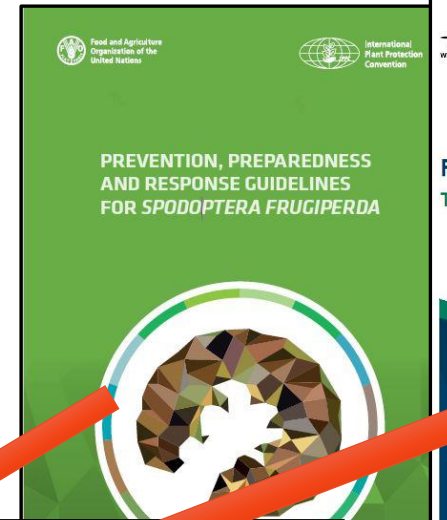
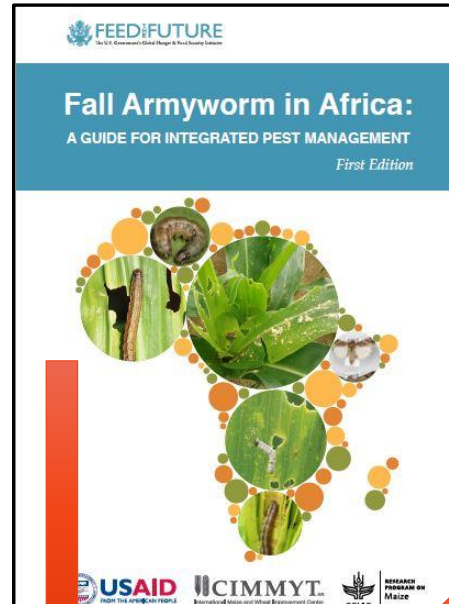


Non-Quarantine pests

Quarantine pests



Spodoptera frugiperda



Survey Guidance for *Spodoptera frugiperda*

Scientific Name
Spodoptera frugiperda (Smith, 1797)

Common Name
Fall armyworm, corn leafworm, southern grass worm, grass worm

Type of Pest
Moth, foliage feeder

Known Hosts
Spodoptera frugiperda has a wide host range but prefers grasses (Family: Poaceae). Preferred crop hosts include: *Zea mays* (maize), *Oryza sativa* (rice), *Sorghum bicolor* (sorghum), and *Saccharum officinarum* (sugarcane).

Other hosts
Other hosts are numerous, including *Medicago sativa* (alfalfa), *Gossypium* spp. (cotton), *Hordeum vulgare* (barley), *Cynodon dactylon* (Bermudagrass), *Lolium* spp. (ryegrass), and *Triticum* spp. (wheat).

Survey Protocol
Surveys should focus on detecting adult moths using pheromone traps. Host plants can be surveyed for the presence of eggs and larvae or evidence of feeding.

Target Life Stage:

- Adult moth, using pheromone traps
- Eggs and larvae, visual survey

Time of year to survey:
Survey can be continuous whenever the host crop is in the field.

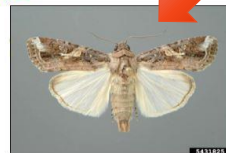


Figure 1. Adult male *Spodoptera frugiperda* moth (Image courtesy of Lyle Buss, University of Florida, Bugwood.org, CC BY 3.0 US)

FALL ARMYWORM: IMPACT AND IMPLICATIONS FOR AFRICA

Roger Day, Peter Bateman, Tim Beale, Victor Clottey, Matthew Cock, Yeliza Colmenarez, Nantia Dabire, Josephine Godwin, Jose Gomez, Pablo Gonzalez Moreno, Sean T. Murphy, Birgitte Njiru, Keshu Phiri, Corin Pratt, Silva Silvestri and Arne Witt, Department of Biosciences, University of Nairobi (UK); All other authors: CABI; Corresponding author: CABI, 673 Limuru Road, Nairobi 00621, Nairobi, Kenya. R.Day@cabi.org

Keywords: Fall armyworm, Africa, impact, maize, integrated pest management

to date suggests that both strains of FAW have entered Africa, perhaps as a result of subsequent widespread dispersal by the high (>90%) that the introduction to Africa of the Florida strain of FAW, which is now established in the Caribbean. Based on information from literature, communications and internet mining, countries suspect its presence, or are monitoring the pest in the country (Yemen and Djibouti) have conducted any FAW. Using distribution and climate data from Africa and in Ghana and Zambia investigate the environmental (climatic) distribution of FAW. Results from modelling suggest that FAW could be produced an environment FAW across Africa.



Roger Day

PEST SURVEY CARD

APPROVED: 26 June 2020
0616-20023/tp-efsa-2020-EN-1385

Pest survey card on *Spodoptera frugiperda*

European Food Safety Authority (EFSA),
Mart Klinker, Alice Delbianco, Sylven Vos

Abstract
This pest survey card was prepared in the context of the EFSA mandate on plant pest surveillance (M-2017-0137), at the request of the European Commission. Its purpose is to guide the Member States in preparing data and information for *Spodoptera frugiperda* surveys. These are required to design statistically sound and risk-based pest surveys, in line with current international standards. *Spodoptera frugiperda* is a regulated priority Union quarantine pest in the EU and Member States are therefore required to perform annual surveys. Emergency measures are in place to prevent the introduction into and the spread within the EU. *Spodoptera frugiperda* is not known to occur in the EU, but it could become established in some coastal Mediterranean regions that remain frost-free all year. Climate is therefore a limiting factor for the establishment of the pest. The optimum temperature for development from egg to adult is 28°C. *Spodoptera frugiperda* is a polyphagous pest and detection surveys should mainly target maize, rice and sorghum, while delimiting surveys should focus on the survey area. Due to the high spread capacity of the adults, detection of the pest is crucial to avoid further spread of the pest. Detection surveys to confirm the presence of the pest should be based on a trapping strategy. After a finding, trapping should be intensified in the neighbouring fields and combined with the visual examination of host plants for the symptoms and early stages of *S. frugiperda*. Morphological and molecular procedures are both available for the identification of *S. frugiperda*. If experience is lacking or the purpose is to identify the early stages of the pest, molecular methods are preferred over the morphological ones.

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CAPS

Cooperative Agricultural Pest Survey

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QUICK LINKS

Guidelines

OFP
(CAPS)

SSF
(CAPS)

Training

CAPS Resource and Collaboration Site

This site is designed to support the Cooperative Agricultural Pest Survey (CAPS) community. You'll find a variety of resources here including the approved methods for National Priority Pests. The CAPS Program is under the Animal and Plant Health Inspection Service (APHIS) - Plant Protection and Quarantine (PPQ).

PPQ safeguards U.S. agriculture and natural resources against the entry, establishment, and spread of economically and environmentally significant pests, and facilitates the safe trade of agricultural products.

The CAPS Program supports PPQ's mission by conducting exotic plant pest surveys through a national network of cooperators and stakeholders to protect American agriculture and natural resources.

Recent Updates:

- The [FY2024 CAPS Guidelines](#) are available. Cooperators need to read and follow these guidelines when submitting workplans.
- The [National Priority Pest List](#) was updated.

CAPS
Purdue University

<https://caps.ceris.purdue.edu/>

Pest Tracker



Approved Methods for Pest Surveillance

[HOME](#)[APPROVED METHODS](#)[HOST MATRIX](#)[FORMER PRIORITY PESTS](#)[PEST SEARCH](#)[VERSION UPDATE](#)

2024 Approved Methods for National Priority Pests

The National Priority Pest List represents the national priorities for the Cooperative Agricultural Pest Survey (CAPS) program, Plant Protection Act 7721 (PPA 7721) Goal 1 National priority Surveys, and PPQ Pest Detection surveys.

This table is updated annually and may be modified throughout the year.

PPQ provides the following support for National Priority Pests:

1. Detailed information about the pests
2. Survey supplies where appropriate
3. The approved methods found below

You can also search for approved traps and lures using this table.

Do you need to identify targets for bundled surveys?

[Use the Host Matrix](#)

Do you need guidance on including former priority pests in your survey?

[Use the Former Priority Pest List](#)

103 !

Download results to Excel

Search:

Pest Scientific Name	Pest Common Name	List(s)	Survey Type(s)	ID/Diagnostic Type
Approved Methods <i>Adoxophyes orana</i>	Summer fruit Tortrix moth	Stone Fruit	Trap	Morphological
Approved Methods <i>Agrilus biguttatus</i>	Oak splendour beetle	Exotic Wood Borer / Bark Beetle Oak	Cerceris Sample	Morphological
Approved Methods <i>Alectra vogelii</i>	Yellow witchweed	Soybean	Visual	Morphological
Approved Methods <i>Anoplophora chinensis</i>	Citrus longhorned beetle	No Manual - See Host Matrix	Visual	Morphological

Approved Methods for Pest Surveillance

HOME APPROVED METHODS HOST MATRIX FORMER PRIORITY PESTS PEST SEARCH

Red palm weevil - *Rhynchophorus ferrugineus*

Effective: March 20, 2014

Taxonomic Position: Coleoptera : Curculionidae

Pest Type: Insects

Pest Code (NAPIS): INASMKKA

This pest is a member of the following surveys: Palm

These Approved Methods are appropriate for: 2024, 2023, 2022, 2021, 2020, 2019, 2018, 2017, 2016, 2015

Pest Information

CAPS Pest Datasheet: <https://download.ceris.purdue.edu/file/3062>

Pest Tracker: <https://pesttracker.org/pest/INASMKKA>

Hosts Identified in the CAPS Host Matrix:

New World palm/Palmetto; Palm (coconut palm, oil palm, etc.)

Human and Animal Pathogens Transmitted:

Not known to transmit any human or animal pathogens.

Pest Pathogens and Organisms Vectors:

Not known to vector any pathogens or other associated organisms.

*Rhynchophorus
ferrugineus*

<https://caps.ceris.purdue.edu/>

The **Approved Methods** page for each species describes the best science-based methods to use for detection surveys



FAO, 2017

Survey

Approved Method(s)

Method	Detail	NAPIS Survey Method
Trap	26 - Palm Weevil Bucket Trap	3001 - General Trapping Procedure
Trap	23 - Homemade 5-Gallon Bucket Trap	3001 - General Trapping Procedure
Visual	See the CPHST pest datasheet for detailed survey instructions.	3031 - General Visual Observation
Trap	114 - Palm Weevil Cone Trap	3001 - General Trapping Procedure

Method Notes:

3/30/22: The palm weevil cone trap is now approved for use, but it is currently not available for purchase in IPHIS. If procuring this trap, please contact your survey supply coordinator.

6/29/12: For home-made traps, the bucket may range in size from one to five gallons. Previously, only 5 gallon buckets were approved.

Visual surveys may be used to detect larval populations before adults emerge. A trap and lure combination may be used to detect adult populations. See the Pest Datasheet for survey instructions. See USDA (2010) for instructions on making a Home-made trap.

Approved Lure(s)

NAPIS Code	Product	Dispenser	Effectiveness	Compound(s)
108	Rhynchophorus ferrugineus Aggregation Lure	polysleeve	42 days	ferrugineol 4me-9-5Kt
	Palm Weevil Lure, Ethyl Acetate	polysleeve	42 days	ethyl acetate
	Food bait (Rhynchophorus spp.)	N/A	7 days	sugar cane cut apples palm pieces 10% molasses con

Lure Notes:

6/29/12: The length of effectiveness of all three palm weevil lures (*Rhynchophorus ferrugineus* Aggregation Lure, *Rhynchophorus palmarum* Aggregation Lure, and Palm Weevil Lure, Ethyl Acetate) has been changed from 84 days to 42 days. The release rates and longevity of the lures are also based on temperature (i.e., the release rate increases at higher temperatures). Lures may need to be changed more frequently in hot, dry regions such as ¹Hertl, Peter - MRP-APHIS (peter.hertl@usda.gov) is signed in

At the present time, it appears that placing pheromones for both *R. ferrugineus* and *R. palmarum*, the South American Palm Weevil, in the same trap is an acceptable practice. Therefore, if both pests are targets, the trap should be baited with the pheromone lures for *R. ferrugineus* and *R. palmarum*, ethyl acetate, and the food bait.

Survey Recommendations

The following are recommendations for executing the survey using the approved methods for pest surveillance. The recommendations are developed through literature review and consultation with subject matter experts.

Key Diagnostic or Identification

Approved Method(s)

ID/Diagnostic:

Morphological identification should be verified by an identifier with expertise in the *Rhynchophorus* genus. A microscope with x50 magnification is needed.

Mistaken Identities:

Rhynchophorus palmarum and *R. cruentatus* (native to the southeastern United States)

References

- Al-Ajlani, A.M. 2008. Red Palm Weevil, *Rhynchophorus ferrugineus* (Olivier) (Coleoptera: Curculionidae). *Encyclopedia of Entomology*, 3127-3130.
- EPPO. 2007. Diagnostics. *Rhynchophorus ferrugineus* and *Rhynchophorus palmarum* (PM 7/83 (1)). EPPO Bulletin, 37(3), 571-579. (Key to adult and larvae)
- Floyd, J. 2012. Protocol for Preparing and Forwarding Suspect South American Palm Weevil from Survey Traps for Confirmation and to Maximize Red Ring Nematode Detection. USDA-APHIS-PPQ.
- USDA-APHIS-PPQ-EDP. 2010. New Pest Response Guidelines. Red Palm Weevil, *Rhynchophorus ferrugineus* Riverdale, Maryland.

If you are unable to find a reference, contact STCAPS@usda.gov. See the CAPS Pest Datasheet for all references.

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

Rhynchophorus ferrugineus

Scientific Name

Rhynchophorus ferrugineus (Olivier, 1790)

Common Name

Red palm weevil, Asiatic palm weevil, coconut weevil, red stripe weevil

Type of Pest

Weevil

Taxonomic Position

Class: Insecta, **Order:** Coleoptera, **Family:** Curculionidae (often listed as Dryophthoridae)

Notes on taxonomy and nomenclature: There is an array of color variations across the native and introduced range of *Rhynchophorus ferrugineus* (Fig. 1), and the taxonomy has changed multiple times in the past. Recent molecular research suggests that *Rhynchophorus ferrugineus* may actually be a species complex composed of two or more cryptic species (Rugman-Jones et al., 2013).

A closely related and similar species, *Rhynchophorus vulneratus* (Panzer) (Fig. 2), was detected and eradicated in Laguna Beach, California in 2010 (Hoddel et al., 2017; Rugman-Jones et al., 2013). PPQ acknowledges there are two species, but for detection and operational purposes, both will be handled in the same way.

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 morphological descriptions, see the Identification/Diagnostic resources on the AMPS pest page on the CAPS Resource and Collaboration website.



Figure 1. *R. ferrugineus* adult (Image courtesy of Amy Roda, USDA-APHIS).



Figure 2. *R. vulneratus* adult, red stripe color morph (Image courtesy of Center for Invasive Species Research).

We used
information from
the existing pest
datasheets to
formulate the
surveys for Africa...

and you can do the
same to develop
your own pest
survey!

Not all pests are that easy...

Survey Guidance for *Diastocera trifasciata*

Scientific Name

Diastocera trifasciata (Fabricius)

Synonym: *Analeptes trifasciata* Fabricius

Common Name

Stem girdler

Type of Pest

Flat-faced longhorn beetle, branch girdler

Taxonomic Position

Class: Insecta **Order:** Coleoptera

Family: Cerambycidae **Subfamily:** Lamiinae

Known Hosts

Preferred hosts

Anacardium occidentale (cashew), *Sterculia setigera* (kukkuki), and *Annona senegalensis* (wild soursop)

Other hosts

Adansonia digitata, *Bombax costatum*, *Ceiba penlandra*, *Eucalyptus saligna*, *E. camaldulensis*, *E. globulus*, *Lannea nigrilana*, *L. triphylla*, *Sclerocarya birrea*, *Spondias monbin*, and *Pseudospondias microcarpa*

Survey Protocol

Target Life Stage:

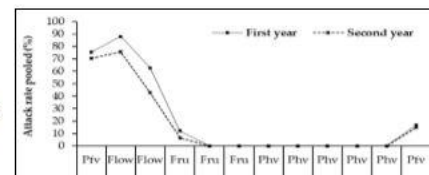
Visual survey for adults, however visual surveys of damage may be used to detect populations when adults are not present.

Time of year to survey:

- Visual surveys for adults on branches of host trees from the end of the dry season until flowers begin to appear on the trees.
- Visual surveys for cut branches containing eggs, larvae, and pupae can be carried out during the dry season when adults are not present.

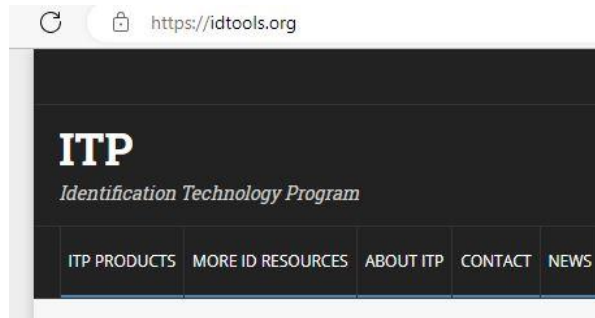


Figure 1. Adults of *D. trifasciata* (USDA)



In cases where survey protocols and methods have not been developed by other nations, the information will have to be extracted directly from the scientific literature.

For this pest, no lures or traps have been developed and only direct sampling methods are available for survey



Another useful site is our ID Tools Website which offers Identification Aids, photos, keys and other useful tools to help **confirm the identity** of specimens captured or collected during the detection survey.

Seven new screening aids released for CAPS surveys

FEBRUARY 21, 2019

ITP is pleased to announce the release of seven new screening aids for important Coleoptera and Lepidoptera pests. These aids were designed specifically to be used when examining plant material through CAPS surveys.

Longicorn ID: Edition 4 available

SEPTEMBER 30, 2020

ITP is pleased to announce new content for Longicorn ID, a tool supporting identification of longhorn beetles (Cerambycidae) by family, subfamily, and tribe. Longicorn ID is available in three editions: Edition 1, Edition 2, and Edition 3.

Search IDaids

Search ITP's IDaid collection for plant pest identification and management.

☒ Scientific name (Accepts name at any taxonomic rank)
☐ Common name

Submit

Selected IDaids for the Tobamovirus Tomato brown rugose fruit virus (ToBRFV)

JANUARY 17, 2020

USDA recently issued a Federal Order imposing restrictions on tomato (*Solanum lycopersicum*) and pepper (*Capsicum* sp.) plants, fruits, and seeds imported from regions where ToBRFV is present. Because of the rapid spread of ToBRFV, it is important to have accurate identification tools available for plant pest identification and management.

<https://idtools.org/>



Key Points Summary

- Look for information developed by other countries and organizations
- Tailor the survey for your country based on the resources available
- For pests with no existing survey protocols, use the scientific literature to find the best survey methods available
- **Don't be afraid to ask for help!** We all have an interest in facilitating trade and preventing the spread of plant pests

A stylized orange map of the African continent is centered on the slide. Several leaves in shades of purple, orange, and yellow are scattered around the map, some appearing to grow from it. The background features a warm orange gradient with abstract wavy shapes in shades of green and brown on the right side.

Africa Phytosanitary Programme Africa Train-the-Trainer Workshop Phytosanitary Programme

Thank you

Train-the-Trainer workshop

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