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Field survey guidance for *Diastocera trifasciata*

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Contents

Figures

Introduction

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 field survey guidance therefore provides easy-to-follow guidelines for technical personnel of national plant protection organizations (NPPOs), particularly in Africa, to survey *Diastocera trifasciata*, commonly known as the Stem girdler.

This document a protocol to aid in monitoring, detecting, sample collection and identifying *Diastocera trifasciata*, for effective phytosanitary decision-making to manage the pest risk and protect trade in plants and plant products.

The field 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 IPPC initiative 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 *Diastocera trifasciata* as a priority pest 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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Abbreviations

APHIS	Animal and Plant Health Inspection Service
APP	Africa Phytosanitary Programme
AU-IAPSC	African Union Inter-Africa Phytosanitary Council
FAO	Food and Agriculture Organization of the United Nations
GIS	Geographic Information System
IPPC	International Plant Protection Convention
ISPM	International Standards for Phytosanitary Measures
NPPO	National Plant Protection Organization
PPQ	Plant Protection and Quarantine
USDA	United States Department of Agriculture

Field 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
Family: Lamiinae

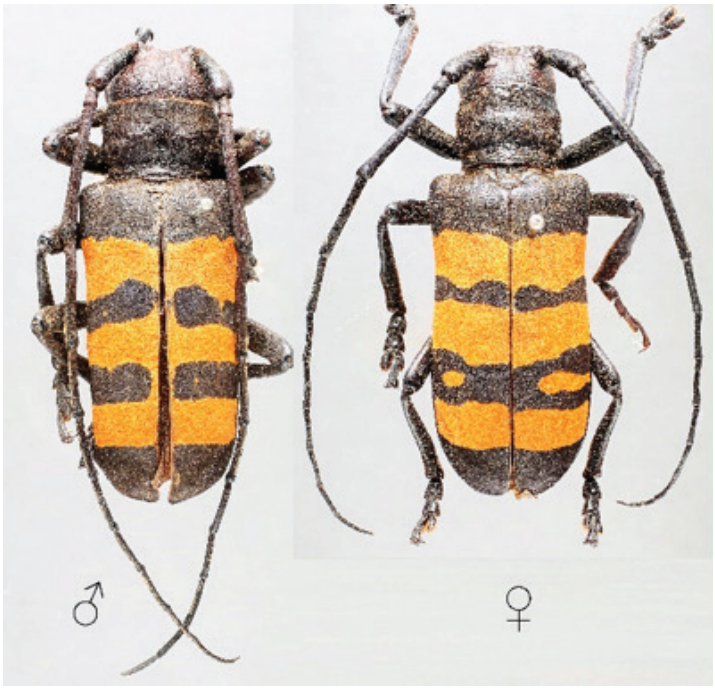

Figure 1: Adults of *D. trifasciata*.
© USDA

Known Hosts
Preferred hosts
Cashew (*Anacardium occidentale*), kukkuki (*Sterculia setigera*) and wild soursop (*Annona senegalensis*).

Other hosts
Baobab (*Adansonia digitata*), red kapok tree (*Bombax costatum*), ceiba (*Ceiba pentandra*), Sydney blue gum (*Eucalyptus saligna*), river red gum (*E. camaldulensis*), Tasmania blue gum (*E. globulus*), *Lannea nigritana, L. triphylla,* mango (*Mangifera indica*), marula (*Sclerocarya birrea*), *Spondias mombin* and *Pseudospondias macrocarpa.*

Survey protocol

Target life stage

Visual survey for adult *D. trifasciata*: 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 can be conducted from the end of the dry season until flowers begin to appear on the tree.
- Visual surveys for cut branches containing eggs, larvae and pupae can be carried out during the dry season when adults are not present.

The first generation of new adults appear at the end of the dry season and can persist for as many as 10 months. Attacks begin when trees are in the preflowering vegetative growth stage and peak during this time. When flowers begin to appear, attacks will begin to decrease and stop at the fruiting and post-harvest vegetative growth stages of the cashew tree (Figure 2).

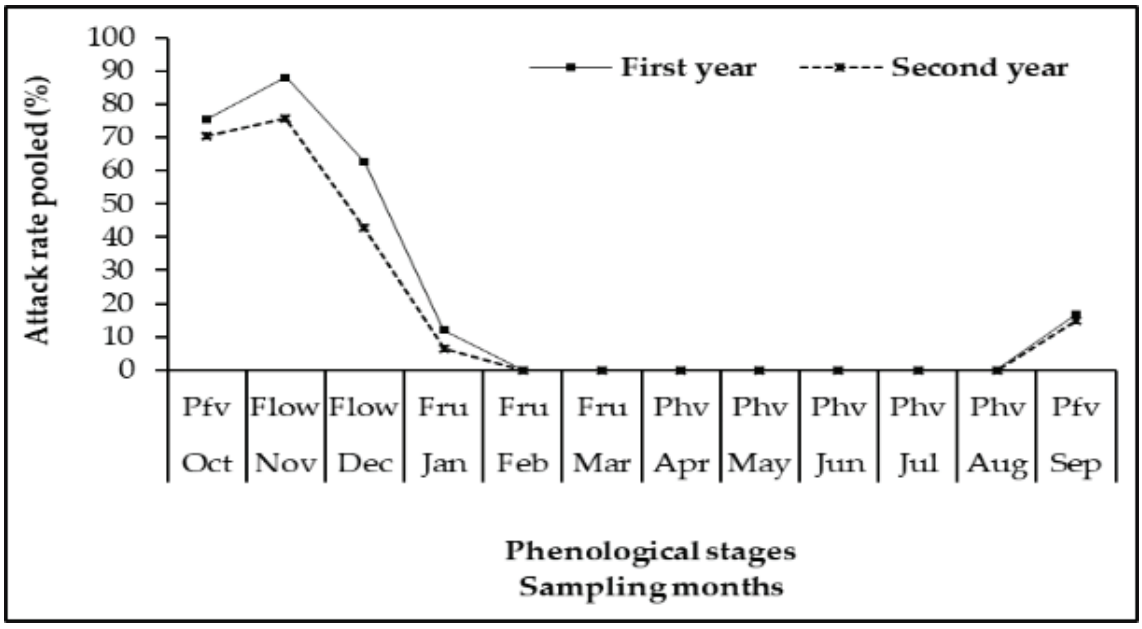

Figure 2: Months where adult *D. trifasciata* were found attacking cashews related to plant phenology in central Côte d'Ivoire. *© Ouali-N'Goran et al., 2020*

Visual survey

Visual inspection: use tools such as beat sheets (light coloured cloth or tarp) and poles to knock beetles off branches of potential hosts.

Signs and symptoms

During the rainy season look for the girdling of branches in host trees and beetles present on the branches near the girdled area. Girdled branches may show signs of girdling, with leaves becoming yellow, and some branches may fall to the ground. You may also see signs of adult feeding, where bark has been scraped from the smaller branches of the tree (Figure 3). and poles to knock beetles off branches of potential hosts.

Figure 3: Adult D. trifasciata shown feeding and scraping off bark from the branch of a host tree.
© Asogwa et al., 2011

Figure 4 shows the stages of attack on cashew tree branches caused by a mating pair of adult *D. trifasciata*. The adults girdle and eventually cut the branches of cashew trees over the course of 9 to 15 days. Branches range in size from 8.5 cm to 35 cm around and 1 m to 4.9 m long. Females lay an egg in the cut branch that either falls to the ground or remains attached to the tree.

Adults are large (30 mm–45 mm in length) and conspicuous and can typically be seen from the ground as they begin to girdle tree branches. When the girdle reaches the sapwood, the yellowing of leaves on the girdled branch may be observed. Cut branches look like they have been cut with a saw (Figure 4(f)). The oviposition holes made on the cut branches, as well as the exit holes made by the newly emerged adults may also be easily seen on cut branches that have fallen to the ground.

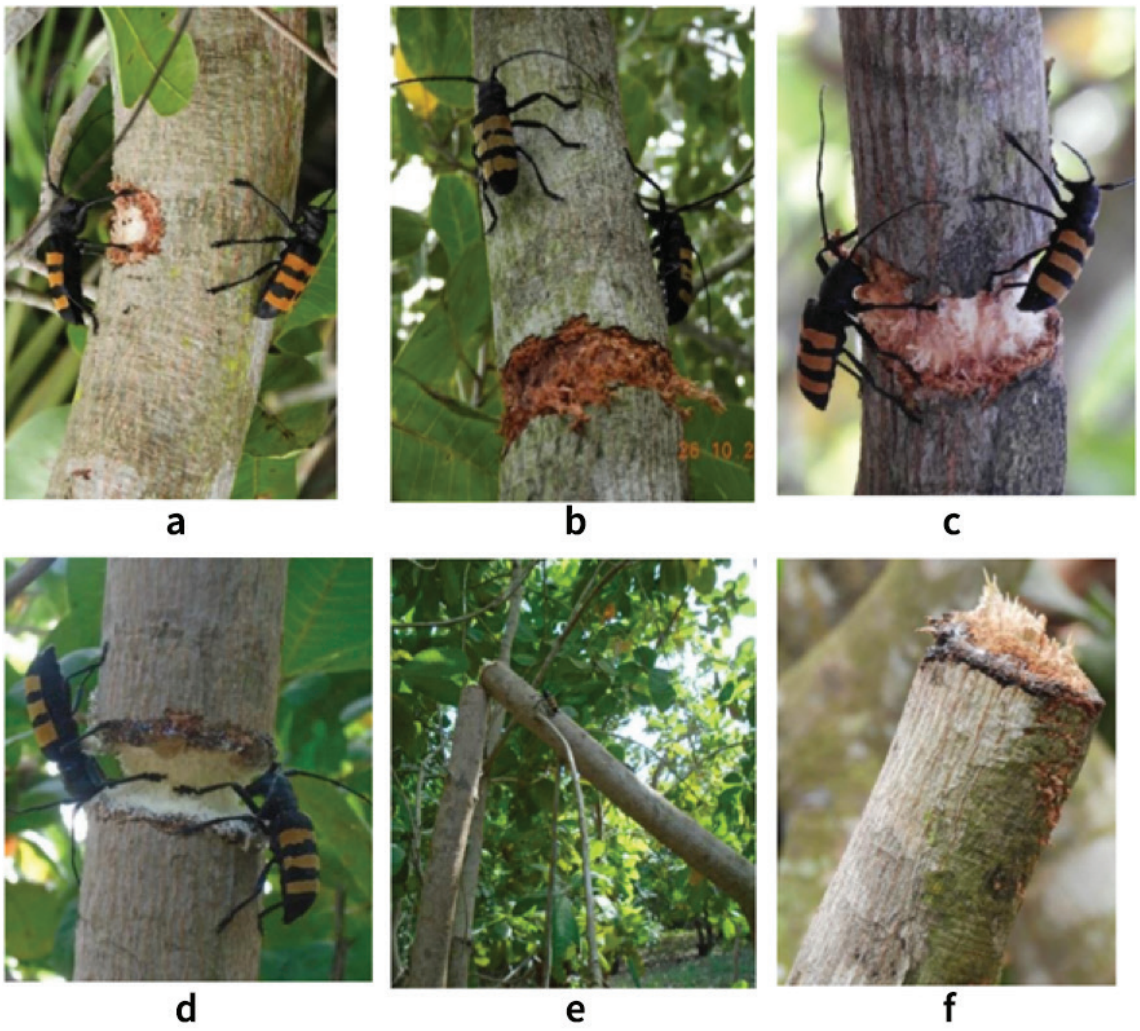

Figure 4: Sequence of damage to cashew tree by *D. trifasciata*
© Ouali-N'Goran et al., 2020

Survey site selection

Cashew plantations or other places where host material is abundant

Sample collection

Collect adults with beat sheets or by hand if they are within reach. Place them in a jar with 70 percent alcohol to be sent for final identification. If cut branches are present with clear oviposition holes, they can be collected and wrapped with a mesh bag until the adults emerge. Pictures from the field can also be helpful to identifiers to see the location, full host, symptoms or how the suspect insect looked in the field prior to sampling.

Pest identification and diagnostics

Morphological examination of adults using a microscope with a 50x zoom is needed to confirm identification. A final identification by a Cerambycid expert may be made based on external structures.

Pest description

Diastocera trifasciata are large (30mm–45mm) longhorn beetles that attack cashews. They can be seen crawling on or flying near cashew tree branches. Females lay a single egg in each cut branch where the larvae develop. They produce one generation per year, taking 167–240 days to develop from eggs to an adult, after which the adults can live for another 168–208 days.

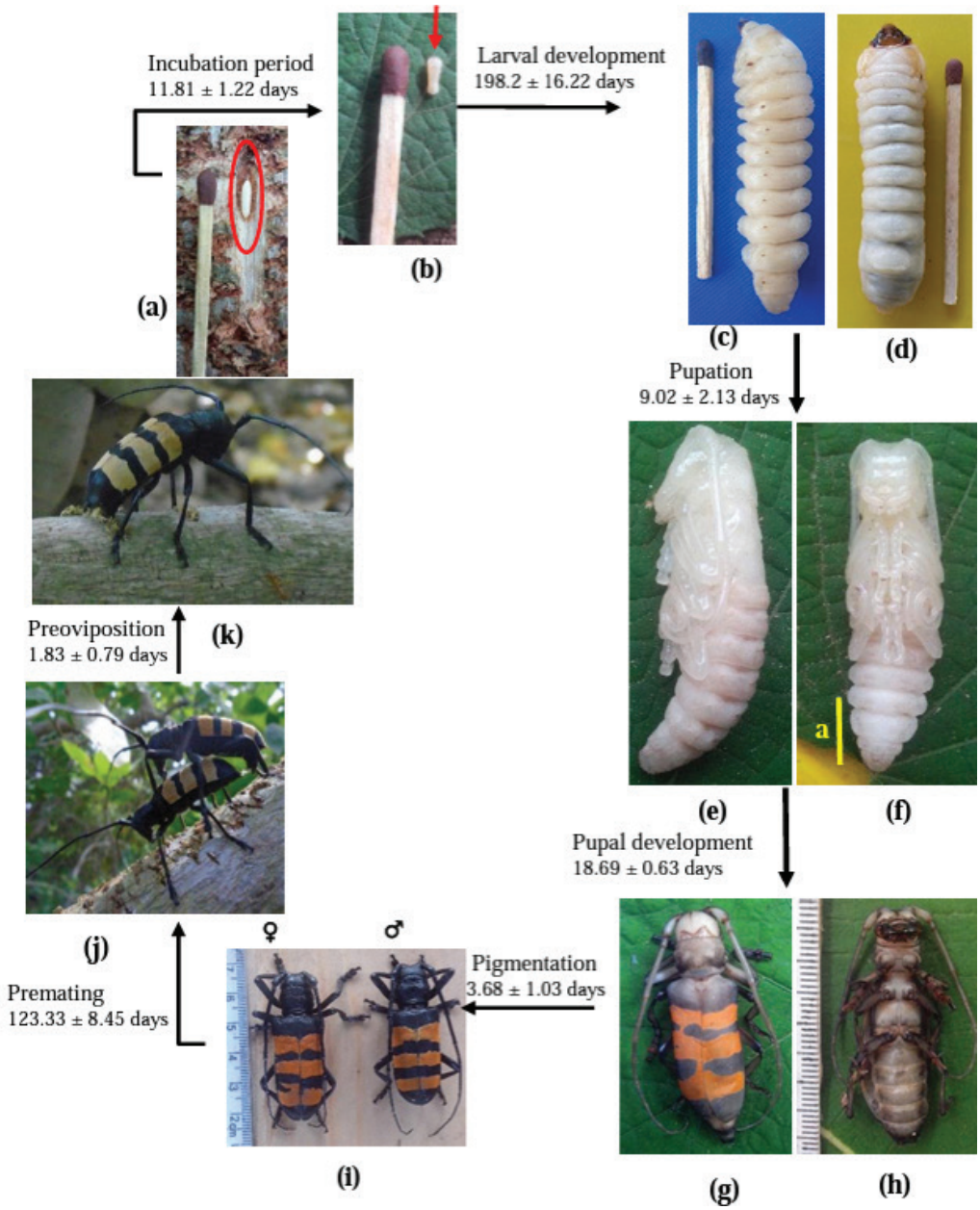

Figure 5: Life cycle of *D. trifasciata*
© Akessé and Ouali-N'Goran, 2018

Adults: Adult male and females are similar in size (30 mm–45 mm) and appearance with black bodies and typically three, wide, horizontal orange stripes on the elytra. Males tend to be larger than females with noticeably longer antennae (Figure 1). Females live longer than males (178–208 days, compared to 168–201 days) and will lay eggs for about 64 days, for a total of 126–200 eggs per female.

Eggs: Eggs look like a grain of rice and are about 6 mm in length, oval and white. Eggs hatch about 12 days after being laid.

Larvae: Larvae are translucent to a cream-white colour and grow from about 5 mm in length to 48 mm as final instars in 169 to 226 days.

Pupae: Pupae are white or black depending on the stage of development, have a length of 23.5 mm–46.9 mm and take about 18 days to transform into adults. After the pupae emerge as adults, they spend about 3 days in the pupal chamber as their cuticle hardens. When they emerge, they chew a circular exit hole in the cut branch that is about 18 mm across.

Identification and diagnostic resources

Morphological characters are described in N'Goran *et al.* and additional photos of similar beetles can be found on Cerambycoidea.com. There is no key specific to the tribe Ceroplesini, to which *D. trifasciata* belongs, but there is an online key to the tribes of Lamiinae that could be useful at Lamiines of the World (lamiinae.org).

Easily mistaken species

Ceroplesis aestuans (Olivier) (Figure 6).
Ceroplesis aestuans guineensis (Hintz) looks like *D. trifasciata* and is present in Africa where it has been found on cashew and on mango in Morocco. This beetle is smaller in size (23 mm–35.5 mm) and the antennae do not extend beyond the length of the body on females.

Figure 6: Female (30 mm) left and male (25 mm) right of C. aestuans from Senegal
© Roguet, J.P., 2023

There are several other species of *Ceroplesis* that have similar colouring to *D. trifasciata*, but most are smaller in size. We suggest final identification be made by an expert on Cerambycids.

Commonly encountered non-targets

Apate terebrans (Pallas) does not look like *D. trifasciata*, but is more common in some cashew orchards, and causes the same type of damage. *Paranaleptes reticulata* (Thomson) also girdle cashew trees and is present in Africa but is smaller in size and does not have stripes like *D. trifasciata*.

Image citations

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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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