



# Forestry Department

Food and Agriculture Organization of the United Nations

## Forest Health & Biosecurity Working Papers

### OVERVIEW OF FOREST PESTS

### BELIZE

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Forest Resources Development Service  
Forest Management Division  
Forestry Department

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### **DISCLAIMER**

The aim of this document is to give an overview of the forest pest<sup>1</sup> situation in Belize. It is not intended to be a comprehensive review.

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

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<sup>1</sup> Pest: Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products (FAO, 2004).

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## Background

This paper is one of a series of FAO documents on forest-related health and biosecurity issues. The purpose of these papers is to provide early information on on-going activities and programmes, and to stimulate discussion.

In an attempt to quantify the impacts of the many factors that affect the health and vitality of a forest, the Global Forest Resources Assessment 2005 (FRA 2005) asked countries to report on the area of forest affected by disturbances, including forest fires, insects, diseases and other disturbances such as weather-related damage. However, most countries were not able to provide reliable information because they do not systematically monitor these variables.

In order to obtain a more complete picture of forest health, FAO continues to work on several follow-up studies. A review of forest pests in both naturally regenerating forests and planted forests was carried out in 25 countries representing all regions of the world. This *Overview of forest pests* represents one paper resulting from this review. Countries in this present series include Argentina, Belize, Brazil, Chile, China, Cyprus, Colombia, Ghana, Honduras, India, Indonesia, Kenya, Kyrgyz Republic, Malawi, Mauritius, Mexico, Moldova, Mongolia, Morocco, South Africa, Sudan, Thailand, Romania, Russian Federation, Uruguay; this list will be continuously updated.

Comments and feedback are welcome. For further information or if you are interested in participating in this process and providing information on insect pests, diseases and mammals affecting forests and the forest sector in your country, please contact:

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## Acknowledgements

The information on Belize was validated by F. Castañeda and compiled by B. Moore.

## BELIZE

### ***Introduction***

Forests cover 1.653 million hectares of Belize representing approximately 72 percent of the country's total land area (FAO, 2006). Other wooded lands cover approximately 115 000 ha (FAO, 2006). To date, it appears that there are about 3 000 ha of plantations in the whole country, which include some pine research plots of the government in Punta Gorda and some small private mahogany plantations (Belize Forest Department and FAO, 2004). Broadleaf forest covers around 70 percent of the forest area while the pine forest is 2.98 percent (Belize Forest Department and FAO, 2004). The remaining 5.59 percent is made up of bamboo, shrubs, mangroves and palms. The most common commercial tree species include *Swietenia macrophylla*, *Cedrela mexicana*, *Pinus caribaea*, *Virola koschnyi*, *Calophyllum brasiliense*, *Terminalia amazonia*, *Lonchocarpus castollii*, *Vochysia hondurensis*, *Astronium graveolems*, *Cordia dodecandra* and *Cordia alliodora*.

In recent years, forests in Belize have been significantly affected by hurricanes – Chantal, Keith and Iris have all affected parts of the north and south of Belize (FAO, 2005). Hurricane Chantal left its impact in the form of sustained flooding, while the other two caused both flooding and wind damage. In 2001, parts of the two southern districts of the country experienced considerable damage after the passage of Hurricane Iris. The Columbia Forest Reserve, which represented a major proportion of the remaining mature broadleaf forest suitable for multiple uses, was completely damaged by Hurricane Iris.

The Mountain Pine Ridge Forest Reserve in the mid-western part of the country was severely affected by infestation of bark beetles (Coleoptera: Scolytidae) between 1999 and 2002 (FAO, 2005). This reserve represents the largest block of pine forests in a managed forest in the country. The beetle infestation resulted in damage to and death of approximately seventy percent of the forest. An estimated, but unconfirmed ten to fifteen percent of the pine forests of the South Coastal Plains were similarly affected by the bark beetle infestation.

### ***Forest pests***

#### **Naturally regenerating forests**

##### **Insects**

##### ***Indigenous insects***

##### ***Dendroctonus frontalis* Zimmermann, 1868**

Other scientific names: *Dendroctonus arizonicus* Hopkins

Coleoptera: Scolytidae

Common names: southern pine beetle; bark beetle

Host type: conifer

Hosts: *Pinus* spp.

The most damaging insect to pine forests in Belize is the southern pine beetle, *Dendroctonus frontalis*. This insect breeds in the cambium layer of a number of pine species. They kill trees by a combination of two factors: girdling during construction of egg galleries; and the introduction of blue stain fungi of the genus *Ophiostoma*. *D. frontalis* has a wide distribution occurring from Pennsylvania in the United States south to Mexico, Belize, Guatemala, Honduras and Nicaragua.

From early 2000 to late 2001, over 25 000 ha of mature pine stands (*P. caribaea* and *Pinus patula* var. *tecumumani*) suffered nearly 100 percent mortality from an outbreak of *D. frontalis* in Belize. This outbreak was part of a regional outbreak that also involved Guatemala, Honduras and Nicaragua. The devastated area represents about 60 percent of the entire Mountain Pine Ridge Forest Reserve and about 80 percent of the pine ecosystem within the reserve. In 2001, the outbreak spread to the *P. caribaea* stands along the southern coastal savannahs near the town of Independence, affecting about 30 percent of these stands. By March 2002 the beetle outbreak had largely subsided.

Some bark beetles are strong fliers with the ability to migrate long distances. However, the most common mode of introduction into new areas is unseasoned sawn wood and wooden crates with bark on them. If wood is barked, there is no possibility of introducing bark beetles. Dunnage is also a high risk category of material.

Please note that there is debate as to whether the species in Belize is *D. frontalis* or a new species. This debate is ongoing.

<http://www.fao.org/forestry/site/20528/en/blz>

<http://www.fao.org/docrep/007/y5507e/y5507e05.htm>

[http://ncrs.fs.fed.us/pubs/jrnl/2000/nc\\_2000\\_Haack\\_004.pdf](http://ncrs.fs.fed.us/pubs/jrnl/2000/nc_2000_Haack_004.pdf)

<http://www.bugwood.org/factsheets/99-008.html>

<http://www.barkbeetles.org/spb.html>

[http://www.eppo.org/QUARANTINE/insects/Dendroctonus\\_frontalis/DENCFR\\_ds.pdf](http://www.eppo.org/QUARANTINE/insects/Dendroctonus_frontalis/DENCFR_ds.pdf)

[http://www.fire.uni-freiburg.de/GlobalNetworks/MesoAmerica/Fire-Beetle-USFS-](http://www.fire.uni-freiburg.de/GlobalNetworks/MesoAmerica/Fire-Beetle-USFS-Report-2002.PDF)

[Report-2002.PDF](http://www.fire.uni-freiburg.de/GlobalNetworks/MesoAmerica/Fire-Beetle-USFS-Report-2002.PDF)

<http://www.padil.gov.au/viewPest.aspx?id=300>

### ***Ips calligraphus* (Germar, 1824)**

Other scientific names: *Bostrichus calligraphus* Germar; *Ips exesus* (Say, 1826); *Ips praemorsus* (Eichhoff, 1868); *Ips ponderosae* Swaine, 1925; *Ips interstitialis* (Eichhoff, 1869)

Coleoptera: Scolytidae

Common names: coarse writing engraver; western six-spined engraver; six-spined ips; six-spined engraver beetle

Host type: conifer

Hosts: *Pinus* spp.

*Ips calligraphus* attacks *Pinus* spp., infests freshly cut logs and pulpwood and introduces bluestain fungi into host species. Like other scolytids, *Ips* spp. periodically cause loss of wood (cut wood and sometimes standing trees) over extensive areas. Their galleries do not affect the structural properties of the wood significantly, but may render it useless for veneer or furniture making. They tend to be less aggressive and less host-specific than

*Dendroctonus* spp. They mostly breed in slash, or in broken, fallen or dying trees, but *I. calligraphus* can, under favourable conditions, make successful primary attacks on healthy *Pinus* stands.

Trees attacked by *Ips* bark beetles typically exhibit needles turning yellow or red. Infested trees will have dry, reddish-brown boring dust in the bark crevices. Some trees may have dime-size or smaller, white to reddish-brown projections, called pitch tubes in the bark crevices.

Some bark beetles are strong fliers with the ability to migrate long distances. The most common mode of introduction into new areas is unseasoned sawn wood and wooden crates with bark on them. If wood is barked, there is no possibility of introducing bark beetles. Dunnage is also a high-hazard category of material.

[http://ncrs.fs.fed.us/pubs/jrnl/2000/nc\\_2000\\_Haack\\_004.pdf](http://ncrs.fs.fed.us/pubs/jrnl/2000/nc_2000_Haack_004.pdf)

[http://www.eppo.org/QUARANTINE/insects/Ips\\_calligraphus/IPSXCA\\_ds.pdf](http://www.eppo.org/QUARANTINE/insects/Ips_calligraphus/IPSXCA_ds.pdf)

<http://www.barkbeetles.org/browse/subject.cfm?SUB=42>

<http://www.forestpests.org/southern/ipsengraver.html>

<http://www.barkbeetles.org/ips/ipsfidl.htm>

<http://www.barkbeetles.org/Biocontol/sixspinedips.html>

<http://www.forestryimages.org/browse/subimages.cfm?sub=42>

### ***Ips grandicollis* (Eichhoff)**

Other scientific names: *Ips chagnoni* Swaine; *Ips cloudcrofti* Swaine; *Tomicus grandicollis* Eichhoff

Coleoptera: Scolytidae

Common names: eastern five-spined ips; southern pine engraver

Host type: conifer

Hosts: *Pinus* spp.

Adult and larval *Ips* spp. are bark-feeders mainly attacking declining or dead trees and freshly cut wood. They frequently carry the spores of bluestain fungi (e.g. *Ceratocystis ips*). Like other scolytids, *Ips* spp. periodically cause loss of wood over extensive areas. Their galleries do not affect the structural properties of the wood significantly, but may render it useless for veneer or furniture making. They tend to be less aggressive and less host-specific than *Dendroctonus* spp. They mostly breed in slash, or in broken, fallen or dying trees. *Ips grandicollis* primarily attacks freshly cut wood but can damage standing trees.

Trees attacked by *Ips* bark beetles typically exhibit needles turning yellow or red. Infested trees will have dry, reddish-brown boring dust in the bark crevices. Some trees may have dime-size or smaller, white to reddish-brown projections, called pitch tubes in the bark crevices.

Some bark beetles are strong fliers with the ability to migrate long distances. The most common mode of introduction into new areas is unseasoned sawn wood and wooden crates with bark on them. If wood is barked, there is no possibility of introducing bark beetles. Dunnage is also a high-hazard category of material.

[http://ncrs.fs.fed.us/pubs/jrnl/2000/nc\\_2000\\_Haack\\_004.pdf](http://ncrs.fs.fed.us/pubs/jrnl/2000/nc_2000_Haack_004.pdf)

[http://www.eppo.org/QUARANTINE/insects/Ips\\_grandicollis/IPSXGR\\_ds.pdf](http://www.eppo.org/QUARANTINE/insects/Ips_grandicollis/IPSXGR_ds.pdf)

<http://www.barkbeetles.org/browse/subject.cfm?SUB=44>  
<http://www.forestpests.org/southern/ipsengraver.html>  
<http://www.barkbeetles.org/ips/ipsfidl.htm>  
<http://www.barkbeetles.org/Biocontrol/easternfivespinedips.html>  
<http://www.forestryimages.org/browse/subimages.cfm?sub=44>

### ***Ips apache* Lanier, 1991**

Other scientific names:

Coleoptera: Scolytidae

Common names:

Host type: conifer

Hosts: *Pinus* spp.; *P. caribaea*

Adult and larval *Ips* spp. are phloeophagous or bark-feeding, mainly attacking declining or dead trees and freshly cut wood. They frequently carry the spores of bluestain fungi (e.g. *Ceratocystis ips*). Like other scolytids, *Ips* spp. periodically cause loss of wood over extensive areas. Their galleries do not affect the structural properties of the wood significantly, but may render it useless for veneer or furniture making. They tend to be less aggressive and less host-specific than *Dendroctonus* spp. They mostly breed in slash, or in broken, fallen or dying trees.

Trees attacked by *Ips* bark beetles typically exhibit needles turning yellow or red. Infested trees will have dry, reddish-brown boring dust in the bark crevices. Some trees may have dime-size or smaller, white to reddish-brown projections, called pitch tubes in the bark crevices.

Some bark beetles are strong fliers with the ability to migrate long distances. The most common mode of introduction into new areas is unseasoned sawn wood and wooden crates with bark on them. If wood is barked, there is no possibility of introducing bark beetles. Dunnage is also a high-hazard category of material.

<http://www.barkbeetles.org/browse/subject.cfm?SUB=13842>

### ***Introduced insects***

No information was found of introduced insects affecting the naturally regenerating forests of Belize.

## **Diseases**

### ***Indigenous diseases***

No records were found of indigenous diseases affecting naturally regenerating forests in Belize.

### ***Introduced diseases***

No records were found of introduced diseases affecting naturally regenerating forests in Belize.

## **Other pests**

### **Indigenous other pests**

No records were found of other indigenous pests (e.g. mites, nematodes, mammals, etc.) affecting naturally regenerating forests in Belize.

### **Introduced other pests**

No records were found of other introduced pests (e.g. mites, nematodes, mammals, etc.) affecting naturally regenerating forests in Belize.

### **Diebacks and other conditions**

No records were found for diebacks and other conditions affecting the naturally regenerating forests of Belize.

## **Planted forests**

### **Insects**

#### **Indigenous insects**

##### ***Hypsipyla grandella* (Zeller, 1848)**

Other scientific names:

Lepidoptera: Pyralidae

Common names: mahogany shoot borer

Host type: broadleaf

Hosts: Meliaceae; *Swietenia* spp.; *Swietenia mahagoni*; *Cedrela* spp.

The mahogany shoot borer is the main pest species of *Swietenia* and *Cedrela* in the New World. The distribution of the mahogany shoot borer coincides with that of its principal host plant species mahogany and 'cedro' and includes the US (southern Florida), most of the West Indies, Sinaloa, Mexico, Central America, and South America except Chile.

The larvae bore into new shoots and twigs of Meliaceae (mahogany family), in particular *Swietenia* spp., killing the first few centimetres as well as attacking seed and fruit capsules. They pupate either in the twigs, shoots or the soil. Damage is caused by the killing of the terminal shoot of the plant which then induces branching and the main stem becomes distorted.

Surveys of 153 planted forests conducted in 2002 in the Yucatan Peninsula indicated that the shoot borer, *Hypsipyla grandella* was one of the major pests of mahogany. Damage was detected in every plantation surveyed with average levels of damage ranging from 7.6 to 42.89 percent.

[http://www.aciar.gov.au/web.nsf/att/JFRN-6BN983/\\$file/pr97chapter2.pdf](http://www.aciar.gov.au/web.nsf/att/JFRN-6BN983/$file/pr97chapter2.pdf)

<http://www.fcla.edu/FlaEnt/fe80p34.htm>

<http://edis.ifas.ufl.edu/IN613>

<http://www.mahoganyforthefuture.org/projectmeliaceae/borer/borer.html>

[http://www.creatures.ifas.ufl.edu/trees/moths/mahogany\\_borer-english.htm](http://www.creatures.ifas.ufl.edu/trees/moths/mahogany_borer-english.htm)

### ***Introduced insects***

No information was found on introduced insects affecting the planted forests of Belize.

## **Diseases**

### ***Indigenous diseases***

No information was found on indigenous diseases impacting the planted forests of Belize.

### ***Introduced diseases***

No information was found on introduced diseases impacting the planted forests of Belize.

## **Other pests**

### ***Indigenous other pests***

No information was found on indigenous other pests (e.g. mites, nematodes, mammals, etc.) impacting the planted forests of Belize.

### ***Introduced other pests***

No information was found on introduced other pests (e.g. mites, nematodes, mammals, etc.) impacting the planted forests of Belize.

## **Diebacks and other conditions**

No records were found for diebacks and other conditions affecting Belize's planted forests.

## ***Capacity for forest health protection***

### **Government level**

Belize generally utilizes three categories of land ownership. National lands are those owned by the government and managed by the Lands and Surveys Department; Protected Areas (including Forest Reserves) are still government-owned but managed by the Forest Department, while private lands are owned by individuals, families or companies.

The Forest Department (Ministry of Natural Resources and the Environment) 'oversees the conservation, protection, management and utilization of Belize's forest resources and its biodiversity, while ensuring that the productive capacity of the forests for both goods and services is maintained or enhanced for the sustainable development of the Belizean people'.

The Forest Department's Strategic Plan 2005-10 outlines the importance of forest health issues and the need to finalize and implement a forest health strategy, improve technical capacity on forest health issues, continue developing baselines for forest health, and identify and prioritize research related to pests and diseases (Government of Belize, 2005).

## Monitoring and detection

Aerial surveys have been carried out to detect infestations of *Dendroctonus frontalis* in the Mountain Pine Ridge Forest Reserve. Little information was found for general monitoring and detection activities.

## Data management

No information was found concerning data management activities in Belize.

## Pest management

Some effort to manage pest and disease outbreaks is usually applied in the reserves, but the infestations outside these areas usually pass unattended because of the scarcity of human and financial resources.

Some measures applied to outbreaks of *Dendroctonus frontalis* include preventative measures, such as thinning to reduce stand density, removal of damaged and weakened trees, and harvesting trees before they reach maturity, and direct control measures, such as salvage removal, cut and leave, and piling and burning of infested trees. Cut and leave consists of felling all trees with fresh attacks or bark beetle brood plus a buffer strip of adjacent uninfested trees. This procedure reduces beetle survival within infested trees and, by disrupting pheromone production, prevents infestations from spreading (Billings *et al.*, 2004).

## Private landowners

The majority of Belize's forests are under public ownership; no information was found regarding private landowners and forest health protection.

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**Billings, R.F., Clarke, S.R., Espino Mendoza, V., Cordon Cabrera, P., Melendez Figueroa, B., Ramon Campos, J. & Baeza, G.** 2004. Bark beetle outbreaks and fire: a devastating combination for Central America's pine forests. *Unasylva*, 55: 15-18.

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<sup>OSN</sup> = Other Scientific Name (other names, synonyms, other combinations, etc. that have been used for this species)

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