



# Forestry Department

Food and Agriculture Organization of the United Nations

## Forest Health & Biosecurity Working Papers

### OVERVIEW OF FOREST PESTS

### REPUBLIC OF MAURITIUS

January 2007

**Forest Resources Development Service  
Forest Management Division  
Forestry Department**

**Working Paper FBS/23E  
FAO, Rome, Italy**

**DISCLAIMER**

The aim of this document is to give an overview of the forest pest<sup>1</sup> situation in the Republic of Mauritius. 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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All contributions will be fully acknowledged.

## **Acknowledgements**

The information for the Republic of Mauritius was compiled by W. Ciesla and B. Moore.

## REPUBLIC OF MAURITIUS

### **Introduction**

Mauritius is an island in the Indian Ocean and lies about 800 km east of Madagascar. It is of volcanic origin, has a tropical climate and is located in the tropical cyclonic belt. The island is swept by the Southeast Trade Winds from April to October. It has a land area of about 203 000 ha and forests cover about 37 000 hectares (18 percent of total land area) (FAO, 2006). Sixty percent of forested lands are in private ownership and the remainder in public ownership.

Significant disturbance was caused to the forests in Mauritius by two recent cyclones – Davina in 1999 (15 ha) and Dina in 2002 (1502 ha). Another major disturbance factor of forests in Mauritius is woody invasive species, which are not dealt with in this document. Kueffer and Mauremootoo (2004) provides detailed information on invasive woody plant species affecting the natural and planted forests of Mauritius.

### **Forest pests**

#### **Naturally regenerating forests**

##### **Insects**

##### **Indigenous insects**

##### ***Cisseis rufobasalis* Fairmaire**

Other scientific names: *Glausites rufobasalis*

Coleoptera: Buprestidae

Common names:

Host type: broadleaf

Hosts: *Cassine orientalis*

*Cisseis rufobasalis* is a buprestid beetle that bores into the stems of the native tree *Cassine orientalis* (FAO, 2005). Native to Madagascar and Mauritius, *Cassine orientalis* is a small tree (3-5m) that forms part of the forest canopy. It is used locally for construction purposes, this beetle damages the timber produced.

##### **Introduced insects**

No information was available on introduced insects impacting naturally regenerating forests in Mauritius.

##### **Diseases**

##### **Indigenous diseases**

No information was available on indigenous diseases impacting naturally regenerating forests in Mauritius.

##### **Introduced diseases**

No information was available on introduced diseases impacting naturally regenerating forests in Mauritius.

## **Other pests**

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

No information was available on indigenous other pests (e.g. mites, nematodes, mammals, etc.) impacting naturally regenerating forests in Mauritius.

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

No information was available on introduced other pests (e.g. mites, nematodes, mammals, etc.) impacting naturally regenerating forests in Mauritius.

## **Diebacks and other conditions**

No information was available on diebacks and other conditions affecting naturally regenerating forests in Mauritius.

## **Planted forests**

### **Insects**

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

No information was available on indigenous insects that affect planted forests in Mauritius.

#### ***Introduced insects***

##### ***Cinara cupressivora* Watson and Voegtlin, 1999**

Other scientific names:

Hemiptera: Aphididae

Common names: giant cypress aphid; cypress aphid

Host type: conifer

Hosts: *Chamaecyparis* spp.; *Cupressus* spp.; *Juniperus* spp.; *Juniperus bermudiana*; *Thuja* spp.; *Cupressocyparis* spp.

In January 1999, the cypress aphid, *Cinara cupressivora*, was detected on Mauritius. This pest feeds on members of the conifer family Cupressaceae (cypress and cedar). On Mauritius, this insect attacks mainly *Juniperus bermudiana* and to a lesser extent, *Thuja* spp. Attacks by the *C. cupressivora* on *J. bermudiana* are the main cause of mortality among the cypress population since 1999 (FAO, 2005). Damage is caused by sucking of the plant sap on terminal growth of young and old trees. Feeding retards new growth and causes desiccation of the stems and a progressive dieback of heavily infested trees. Large amounts of honeydew are also produced by the aphid which provides a medium for the growth of sooty mould and thus reduces photosynthesis.

*Cinara cupressivora* was thought to have first established in Africa in Malawi in 1986. Since then it spread rapidly throughout East and southern Africa causing significant damage. Damage to hosts includes browning and defoliation, which in some cases causes dieback and tree death. A successful biological control programme by the introduction of *Pauesia* spp. in Kenya and Malawi has significantly reduced impact and spread. Exotic conifers attacked include species in the genera *Chamaecyparis*, *Cupressus*, *Juniperus*, *Thuja* and the hybrid genus *Cupressocyparis*. Heavy foliar damage and tree mortality occurs on *Cupressus macrocarpa*. Insects were initially identified as *C. cupressi*, however, detailed diagnostic work determined that they belonged to a new species (which was described as *Cinara cupressivora* by Watson and Voegtlin in 1999).

[Note that numerous references (Web sites and texts) use the name *Cinara cupressi*. These are frequently misidentified specimens of *Cinara cupressivora*. As well, some references incorrectly synonymize these two species.]

<http://www.spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=161&langdisplay=english>

<http://www.issg.org/database/species/ecology.asp?si=121&fr=1&sts=>

<http://www.invasive.org/browse/subimages.cfm?sub=3636>

<http://www.afaef.org/html/98-202.html>

### ***Gonipterus scutellatus* Gyllenhal, 1833**

Other scientific names:

Coleoptera: Curculionidae

Common names: eucalyptus weevil; eucalyptus snout beetle; gum tree weevil

Host type: broadleaf

Hosts: *Eucalyptus* spp.; *Eucalyptus robustus*

*Gonipterus scutellatus* is a leaf-feeding beetle that is a major defoliator of eucalypts. In Australia, where this beetle is a native, some eucalypt plantations have significant problems because of attacks by this beetle. In Mauritius, it is a major defoliator of *Eucalyptus robusta* (FAO, 2005). Attack by this beetle can cause tree mortality, reduction in growth, coppicing, and stunting of trees though some *Eucalyptus* spp. are more susceptible to damage than others.

The females lay eggs in batches on both surfaces of mature leaves; the eggs are covered by a capsule. The larvae emerge and feed on leaves and twigs then pupate in the soil. Adults also feed. There is usually more than one generation per year, with females living for about three months and larval development taking between 30 and 80 days. In some places there are continuous generations. Dispersal is by adult flight, adults hitch-hiking on non-plant material, and movement of infested plant material or soil.

[http://www.eppo.org/QUARANTINE/insects/Gonipterus\\_gibberus/DSGONPSP.pdf](http://www.eppo.org/QUARANTINE/insects/Gonipterus_gibberus/DSGONPSP.pdf)

[http://www.forestry.sa.gov.au/privateforestry/insect\\_fact\\_sheets/Fact\\_Sheet\\_html/FHS%2007%20Eucalyptus%20Weevil.htm](http://www.forestry.sa.gov.au/privateforestry/insect_fact_sheets/Fact_Sheet_html/FHS%2007%20Eucalyptus%20Weevil.htm)

<http://fabinet.up.ac.za/biennialreport/docs/report1.pdf>

[http://acwm.co.la.ca.us/pdf/Eucalyptusweevileng\\_pdf.pdf](http://acwm.co.la.ca.us/pdf/Eucalyptusweevileng_pdf.pdf)

[http://webs.uvigo.es/adolfo.cordero/PDF/Forestry\\_vol\\_73\\_pp\\_21-29\\_\(2000\).pdf](http://webs.uvigo.es/adolfo.cordero/PDF/Forestry_vol_73_pp_21-29_(2000).pdf)

### ***Heteropsylla cubana* Crawford, 1914**

Other scientific names: *Heteropsylla incisa* (Sulc.)

Hemiptera: Psyllidae

Common names: leucaena psyllid

Host type: broadleaf

Hosts: *Leucaena* spp.; *Leucaena leucocephala*; *Albizia* spp., *Mimosa* spp., *Samanea saman*

Native to Central and South America, *Heteropsylla cubana* (the leucana psyllid) has entered and established in many countries in Africa, Asia and the Pacific. It was first detected in Mauritius in 1992 and then spread quickly throughout the island. This insect is a significant pest of *Leucaena leucocephala* and causes defoliation, wilting, dieback and in some cases, tree death. This bug feeds on young growth and occasionally older growth and flowers. The impact caused by this insect was especially severe on the island of Rodrigues because the foliage of *Leucaena leucocephala* is used as fodder for livestock (Rawanawshah, 1995).

[http://www.cifor.cgiar.org/publications/pdf\\_files/Insect-pests.pdf](http://www.cifor.cgiar.org/publications/pdf_files/Insect-pests.pdf)

<http://www.afaec.org/html/98-201.html>

[http://www.ento.csiro.au/aicn/name\\_s/b\\_1961.htm](http://www.ento.csiro.au/aicn/name_s/b_1961.htm)

<http://www.forestpests.org/subject.html?SUB=307>

[http://www.deh.gov.au/cgi-](http://www.deh.gov.au/cgi-bin/abrs/fauna/details.pl?pstrVol=PSYLLOIDEA;pstrTaxa=105;pstrChecklistMode=2)

[bin/abrs/fauna/details.pl?pstrVol=PSYLLOIDEA;pstrTaxa=105;pstrChecklistMode=2](http://www.deh.gov.au/cgi-bin/abrs/fauna/details.pl?pstrVol=PSYLLOIDEA;pstrTaxa=105;pstrChecklistMode=2)

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

Other scientific names:

Lepidoptera: Pyralidae

Common names: mahogany shoot borer

Host type: broadleaf

Hosts: *Swietenia mahagoni*

The mahogany shoot borer is the main pest species of *Swietenia* and *Cedrela* in the New World. In Mauritius, *Swietenia mahagoni* is the main species affected by this insect (FAO, 2005). 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. This species of moth is one of the main factors preventing the ready establishment of mahogany plantations in the region.

[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://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)

### ***Hypsipyla robusta* Moore, 1886**

Other scientific names: *Epicrocis terebrans* Oliff, 1890; *Magiria robusta* Moore, 1886;

*Hypsipyla scabrusculella* Ragonot, 1893; *Hypsipyla pagodella* Ragonot, 1888

Lepidoptera: Pyralidae

Common names: mahogany shoot borer; cedar tip moth



Host type: broadleaf

Hosts: *Khaya* spp.; *Cedrella* spp.; *Toona ciliata*; *Tectona grandis*; *Swietenia macrophylla*

*Hypsipyla robusta* caterpillars bore into the tips and shoots of several high quality timber species including members of the Meliaceae and Verbenaceae families such as *Swietenia macrophylla*, *Toona cilata*, *Cedrella* spp. and *Tectona* spp. In Mauritius, *Swietenia mahagoni* is the species most affected tree species. This pest destroys the apical shoot causing the tree to form many side branches and frequently a deformed trunk leading to a decreased value of the timber. This species of moth mainly attack trees in high light areas, hence the biggest effects are observed in young planted forest areas, particularly, those areas planted with a single species. Young understorey trees in naturally regenerating forests suffer far less damage. As a result of this pest, it is very difficult to establish planted forests in some areas and it is uneconomic to grow species such as red cedar, mahogany and teak. Plantings of mahogany have been almost completely abandoned in some areas because of the damage caused by this insect.

<http://linus.socs.uts.edu.au/~don/larvae/pyra/robust.html>

[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.usyd.edu.au/su/macleay/larvae/pyra/robust.html>

<http://www.fzi.uni-freiburg.de/InsectPestKey-long%20version/hypsipyl.htm>

<http://www.ansinet.org/fulltext/pjbs/pjbs75848-851.pdf>

[http://www.cifor.cgiar.org/publications/pdf\\_files/Insect-pests.pdf](http://www.cifor.cgiar.org/publications/pdf_files/Insect-pests.pdf)

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

## Diseases

### **Indigenous diseases**

#### ***Armillaria* spp.**

Other scientific names:

Basidiomycota: Marasmiaceae

Common names: shoestring root rot; honey mushroom; honey agaric; *Armillaria* root rot

Host type: conifer

Hosts: *Pinus* spp.

In Mauritius, disturbance by disease is mainly caused by *Armillaria* spp. on pine plantations (FAO, 2005). This fungus usually attacks trees that have been stressed or weakened by some other factor such as drought or insect attack. In healthy trees the fungus is isolated by resin to small areas. The infection commences by entering fine root hairs and then spreads throughout the tree. The infection kills the fine root hairs in weakened trees leading to the loss of nutrient and water uptake by the tree. Infection can lead to dieback of limbs or death of the tree. Tree death can take several years. *Armillaria* is a soil borne fungus and the rhizomorphs can grow up to 3m out from the infected tree. It can be difficult to identify the fungus from early symptoms as they are similar to those presented from several causes such as other diseases or physiological stress. Identification of *Armillaria* as a causal agent is often at a relatively late stage in the disease.

<http://www.na.fs.fed.us/spfo/pubs/fidls/armillaria/armillaria.htm>

<http://www.ipm.uiuc.edu/diseases/series600/rpd602/>

## **Introduced diseases**

### ***Subramanianospora vesiculosa* (Butler) Narayanan, Sharma & Minter, 2003**

Other scientific names: *Trichosporium vesiculosum* Butler

Ascomycota: Incertae sedis

Common names: Casuarina blister bark; wilt disease; blister bark disease

Host type: broadleaf

Hosts: *Casuarina equisetifolia*; Casuarinaceae

Wilt or blister bark disease is a destructive disease of *Casuarina equisetifolia* caused by the fungus, *Subramanianospora vesiculosa* (Narayanan, Sharma and Minter, 2003). It was first reported from India in the early 1900s. Later outbreaks were reported from other countries including Indonesia, Mauritius, Thailand and Vietnam (Narayanan *et al.*, 1996; Mireku and Simpson, 2002). Discolouration of the foliage is the initial symptom of blister bark disease and as the disease advances, necrotic lesions appear all over the main stem and branches. Subsequently, all affected trees exhibit symptoms of wilting and drying and are ultimately killed. Likely pathways of introduction for *S. vesiculosa* include dunnage, timber and wood packaging (Mireku and Simpson, 2002).

<http://iufro-down.boku.ac.at/iufro-net/d7/wu70207/writeup.pdf>

<http://www.affa.gov.au/content/output.cfm?ObjectID=D2C48F86-BA1A-11A1-A2200060A1B01742>

<http://rpas.web->

[p.cisti.nrc.ca/RPAS/RPViewDoc?\\_handler\\_=HandleInitialGet&journal=tcjpp&volume=24&articleFile=k02-007.pdf](http://p.cisti.nrc.ca/RPAS/RPViewDoc?_handler_=HandleInitialGet&journal=tcjpp&volume=24&articleFile=k02-007.pdf)

## **Other pests**

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

No information was available on indigenous other pests (e.g. mites, nematodes, mammals, etc.) affecting planted forests in Mauritius.

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

No information was available on introduced other pests (e.g. mites, nematodes, mammals, etc.) affecting planted forests in Mauritius.

## **Diebacks and other conditions**

No records were available for diebacks or other conditions affecting planted forests in Mauritius.

## **Capacity for forest health protection**

### **Government level**

Management of public forest lands is the responsibility of the Forestry Service of the Ministry of Agriculture, Food Technology and Natural Resources. The Entomology and Plant Pathology Divisions of the Agricultural Services of the Ministry are responsible for pest management activities including forests and urban trees.

## Monitoring and detection

No information was available on forest pest monitoring techniques used in Mauritius.

## Data management

Most of the data on forest insects and diseases in Mauritius is qualitative although some estimates of area affected by *Cinara cupressivora* and recent cyclone events are available (FAO, 2005).

## Pest management

Pest management of leucaena psyllid consists of classic biological control using introduced predators and planting of varieties of *Leucaena* that are resistant to the psyllid. A parasitic wasp, *Pauesia juniperorum*, which has shown promising results in controlling *Cinara cupressivora* in other cypress growing countries, has been imported from Kenya. In 2003, this biocontrol agent was released in a few regions and some degree of parasitism was observed in the field. More consignments of parasitoids were imported in 2004 (Republic of Mauritius, n.d.).

## Private landowners

The Entomology Division of the Ministry of Agriculture, Food Technology and Natural Resources has advised private landowners to examine trees to determine if cypress aphid is present on their trees, water trees during dry periods, trim dead branches, and hand pick aphids from small plants and plant species of Cupressaceae (e.g. *Thuja* spp.) that are less susceptible to damage by this insect.

## References

**Food and Agriculture Organization of the United Nations (FAO).** 2004. *International Standards for Phytosanitary Measures #5: Glossary of phytosanitary terms (2004): terms, definitions and supplements (ISPM#5)*. Rome, Italy. Available at:

<https://www.ippc.int/id/13399?language=en>

[https://www.ippc.int/servlet/BinaryDownloaderServlet/76431\\_ISPM\\_05\\_2004\\_English.pdf?filename=1118414766488\\_English\\_final\\_c.pdf&refID=76431](https://www.ippc.int/servlet/BinaryDownloaderServlet/76431_ISPM_05_2004_English.pdf?filename=1118414766488_English_final_c.pdf&refID=76431)

**FAO.** 2005. *Global Forest Resources Assessment 2005 – Mauritius*. Country Report 071. Rome, Italy, 49 pp. Available at: <http://www.fao.org/forestry/site/28699/en>

**FAO.** 2006. *Global Forest Resources Assessment 2005 – progress towards sustainable forest management*. Forestry Paper No. 147. Rome, Italy. Available at:

<http://www.fao.org/docrep/008/a0400e/a0400e00.htm>

**Kueffer, C. & Mauremootoo, J.** 2004. *Case studies on the status of invasive woody plant species in the Western Indian Ocean – 3. Mauritius (Islands of Mauritius and Rodrigues)*. Forest Health & Biosecurity Working Papers FBS/4-3E. Forestry

Department, FAO, Rome, Italy. Available at:

<http://www.fao.org/forestry/foris/webview/mediaview.jsp?mediaId=6841&langId=1>

**Mireku E. & Simpson, J.A.** 2002. Fungal and nematode threats to Australian forests and amenity trees from importation of wood and wood products. *Canadian Journal of Plant Pathology*, 24: 117-124.

**Narayanan, C., Dudzinski, M., Sharma, J.K. & Mohanan, C.** 1996. The extent, recognition and management of blister bark disease. In *Recent Casuarina research and development*. Pinyopusarerk, K., Turnbull, J.W. & Midgley, S.J., eds. Canberra, Australia, CSIRO Forestry and Forest Products, pp. 74-79.

**Narayanan, C., Sharma J.K. & Minter, D.W.** 2003. *Subramanianospora vesiculosa* – a hyphomycete causing wilt disease of *Casuarina equisetifolia*. *Indian Phytopathology*, 56 (2): 159-163.

**Republic of Mauritius.** n.d. *Frequently asked questions – Entomology Division*.

Ministry of Agriculture, Food Technology and Natural Resources. Available at:

[http://ncb.intnet.mu/moa/faq\\_ento.htm](http://ncb.intnet.mu/moa/faq_ento.htm)

**Rawanawshah, T.** 1995. The leucaena psyllid in Mauritius. In *Proceedings – Leucaena psyllid: A threat to agroforestry in Africa*. Dar es Salaam, United Republic of Tanzania. Rome, FAO, pp 78-80. Available at:

<http://www.fao.org/docrep/008/v5020e/v5020e00.htm>

**Watson, G.W., Voegtlin, D.J., Murphy, S T. & Footit, R.G.** 1999. Biogeography of the *Cinara cupressi* complex (Hemiptera: Aphididae) on Cupressaceae, with description of a pest species introduced into Africa. *Bulletin of Entomological Research*, 89: 271-283.

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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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     *Gonipterus scutellatus*, 3
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     *Cinara cupressivora*, 2
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     *Cinara cupressivora*, 2
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     *Hypsipyla robusta*, 5
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     *Heteropsylla cubana*, 4
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     *Heteropsylla cubana*, 4
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     *Hypsipyla grandella*, 4  
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     *Hypsipyla robusta*, 5
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     *Hypsipyla robusta*, 5
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     *Hypsipyla grandella*, 4  
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