



# Forestry Department

Food and Agriculture Organization of the United Nations

## Forest Health & Biosecurity Working Papers

### OVERVIEW OF FOREST PESTS

#### BRAZIL

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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 Brazil. It is not intended to be a comprehensive review.

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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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## BRAZIL

### **Introduction**

Brazil has the world's largest area of tropical rainforest. The country's forest cover in 2005 was estimated at 478 million hectares, or 57 percent of the total land area (FAO, 2006). No information on other areas with trees was available.

In addition, the country has extensive areas of industrial forest plantations, almost 5.4 million hectares or 1.1 percent of the forest area, primarily composed of *Eucalyptus* and *Pinus* spp. (FAO, 2005). A number of indigenous insects have found the *Eucalyptus* plantings to be favorable host material and have become pests. Pine plantations have been less affected by native species; however recent introductions of exotic pests are causing significant damage (FAO, 2006).

In 2000, it was estimated that the average annual forest area affected by insects was 30 000 ha and 20 000 ha was affected by diseases (FAO, 2005). Major reported pest disturbances were caused by *Sirex noctilio*, *Cinara* spp. and *Armillaria* spp. (FAO, 2005).

### **Forest pests**

#### **Naturally regenerating forests**

Relatively little is known about the complex of insects, diseases and other pests affecting Brazil's naturally regenerating forests. Because of the rich diversity of these forests, which provide limited host material for insects, fungi or other damaging agents, pest outbreaks are not an integral part of the dynamics of these forests. The foliage of *Podocarpus lambertii*, one of Brazil's two indigenous conifers, is subject to defoliation by caterpillars of the family Geometridae; however the overall effect on the tree is not known.

### **Insects**

#### **Indigenous insects**

##### ***Dirphia araucariae***

Other scientific names:

Lepidoptera: Saturnidae

Common names: emperor moth

Host type: conifer

Hosts: *Araucaria angustifolia*

*Dirphia araucariae* is a large emperor moth and the caterpillars of this species are significant defoliators. One of the plants they feed on is Parana pine (*Araucaria angustifolia*), an indigenous conifer to Brazil. This tree produces high quality timber and it also has edible seeds which are an important non-wood forest product. The tree is subject to defoliation by *D. araucariae* which causes significant damage including loss of growth. Fire is one of the methods used to control this insect.

<http://www.metla.fi/iufro/iufro95abs/d1pos61.htm>

***Hedypathes betulinus* (Klug, 1825)**

Other scientific names:

Coleoptera: Cerambycidae

Common names: longicorn beetle; longhorn beetle

Host type: broadleaf

Hosts: *Ilex paraguarensis*

*Hedypathes betulinus* is a significant pest of *Ilex paraguarensis*, a medium to small tree native to southern Brazil and adjoining countries. It is used for a local beverage known as yerba mate and thus there are significant plantings of *Ilex paraguarensis* to supplement the native stands. Yerba mate is considered only second to rubber as a non-wood forest resource; hence it has significant social and economic importance. *Hedypathes betulinus* larvae bore into the timber and create extensive galleries. This beetle can kill branches (Iede and da Silva, 1993) and cause extensive damage to trees. The impact of this longhorn beetle is usually noticed to a greater extent in planted forests.

<http://www.metla.fi/iufro/iufro95abs/d2pos84.htm>

***Oncideres dejeani* Thomson, 1868**

Other scientific names:

Coleoptera: Cerambycidae

Common names: longicorn beetle; longhorn beetle

Host type: broadleaf

Hosts: Mimosaceae; *Mimosa scabrella*; *Lithraea brasiliensis*; *Sebastiania brasiliensis*

*Oncideres dejeani* is a pest of Mimosaceae, *Lithraea brasiliensis* and *Sebastiania brasiliensis*. The adult females lay eggs under the green bark of trees, and then girdle/ring the branch effectively killing the section of tree beyond the girdling (Bertalot and Mendoza, 1997). The damage caused by this beetle can kill trees. The infestation levels can be high, up to 90 percent, particularly in planted areas. This beetle causes significant damage to brachytinga (*Mimosa scabrella*) which is a fast-growing legume native to southeastern Brazil that is an important source of fuelwood and other resources. This tree is used extensively in reforesting areas disturbed by mining (Iede and da Silva, 1993; Marques *et al.*, 1995).

<http://www.metla.fi/iufro/iufro95abs/d2pos81.htm>

***Oncideres impluviata* (Germar, 1824)**

Other scientific names:

Coleoptera: Cerambycidae

Common names: longicorn beetle; longhorn beetle; serrador beetle

Host type: broadleaf

Hosts: Mimosaceae; *Mimosa scabrella*; *Acacia mearnsii*

*Oncideres impluviata* is a pest of Mimosaceae. The adult females lay eggs under the green bark of trees and then girdle/ring the branch effectively killing the section of tree beyond the girdling (Bertalot and Mendoza, 1997). The damage caused by this beetle can kill trees. The infestation levels can be high, up to 90 percent, particularly in planted areas. This beetle causes significant damage to brachytinga (*Mimosa scabrella*) which is

a fast-growing legume native to southeastern Brazil that is an important source of fuelwood and other resources. This tree is used extensively in reforestation areas disturbed by mining (Iede and da Silva, 1993; Marques *et al.*, 1995).

<http://www.metla.fi/iufro/iufro95abs/d2pos81.htm>

[http://www.hort.purdue.edu/newcrop/duke\\_energy/Acacia\\_mearnsii.html](http://www.hort.purdue.edu/newcrop/duke_energy/Acacia_mearnsii.html)

<http://www.ufsm.br/cienciaflorestal/artigos/v3n1/art5v3n1.pdf>

### **Introduced insects**

No records were available of introduced insects affecting Brazil's naturally regenerating forests.

## **Diseases**

### **Indigenous diseases**

The foliage of *Podocarpus lambertii*, one of Brazil's two indigenous conifers, is subject to infection by a needle fungus, which gives the foliage a brown discoloration. The overall effect on the tree is not known.

### **Introduced diseases**

No information was available on introduced pathogens affecting naturally regenerating forests in Brazil.

## **Other pests**

### **Indigenous other pests**

No information was available on the status of indigenous other pests (e.g. mites, nematodes, mammals, etc.) in the naturally regenerating forests of Brazil.

### **Introduced other pests**

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

## **Diebacks and other conditions**

No records were available for diebacks and other conditions affecting Brazil's naturally regenerating forests.

## **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.; *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, mahoganies and cedros, 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. This species of moth is one of the main factors preventing the ready establishment of mahogany plantations.

[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)

### ***Megaplatypus mutatus* (Chapuis, 1865)**

Other scientific names: *Platypus mutates*; *Platypus plicatus*; *Platypus sulcatus*

Coleoptera: Platypodidae

Common names: bark beetle; ambrosia beetle

Host type: broadleaf

Hosts: *Calophyllum brasiliense*; *Erythrina crista-galli*; *Eucalyptus europhylla*; *Eucalyptus robusta*; *Luehea divaricata*; *Malus sylvestris*; *Pyrus communis*; *Sebastiania commersoniana*; *Vitex megapotamica*

Found only in Argentina, Brazil and Uruguay, *Megaplatypus mutatus* is a significant pest of numerous tree species. The hosts recorded in Brazil include *Calophyllum brasiliense*, *Erythrina crista-galli*, *Eucalyptus europhylla*, *Eucalyptus robusta*, *Luehea divaricata*, *Malus sylvestris*, *Pyrus communis*, *Sebastiania commersoniana*, and *Vitex megapotamica* (Giménez & Etiennot, 2003). In Uruguay it infests *Pyrus communis*. Hosts in Argentina include *Acer negundo*, *Erythrina crista-galli*, *Eucalyptus dunni*, *Fraxinus excelsior*, *Grevillea robusta*, *Quercus palustris*, *Quercus rubra*, *Ligustrum lucidum*, *Liquidambar styraciflua*, *Melia azedarach*, *Populus alba*, *Salix alba* and *Salix nigra* (Giménez & Etiennot, 2003).

Damage is caused by the adults, which bore extensive gallery systems into living trees. The galleries not only degrade the quality of wood but cause structural weakness and wind-throw following severe storms (Alfaro, 2003).

<http://www.fao.org/forestry/foris/webview/common/media.jsp?mediaId=7544&langId=1>

[http://www.eppo.org/QUARANTINE/Alert\\_List/insects/PLTPMU.htm](http://www.eppo.org/QUARANTINE/Alert_List/insects/PLTPMU.htm)

### ***Sarsina violascens* Herrich-Schaeffer, 1856**



Other scientific names:

Lepidoptera: Lymantriidae

Common names: purple moth

Host type: broadleaf

Hosts: *Eucalyptus* spp.; *Psidium* spp.; *Mikania* spp.; *Osmanthus* spp.

*Sarsina violascens* is an indigenous polyphagous caterpillar that has the capacity to thrive on new hosts, including introduced *Eucalyptus* species. This species is indigenous to Brazil and neighbouring countries (Zanuncio, 1976; Berti Filho, 1983; Zanuncio *et al.*, 1992). *S. violascens* causes localized defoliation in Brazil (hundreds of hectares) (Zanuncio and de Lima, 1975). The impact of defoliation on eucalyptus plantations in Brazil is not clearly understood. Defoliation can reduce growth rates and can be unsightly; however, the ability of insect defoliation to kill *Eucalyptus* is considered unlikely (de Oliveira *et al.*, 2003). More likely it would cause stress to the trees and make them susceptible to attack by secondary invaders.

*S. violascens* is capable of hundreds of kilometres of dispersal in both adult and juvenile stages, and hence has the capacity to spread into new areas. Other methods of introduction to new areas include the accidental transport of egg masses or adults being attracted to lights and then carried on vehicles.

<http://spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=10&langdisplay=english>

### ***Thyriniteina arnobia* (Stoll, 1782)**

Other scientific names:

Lepidoptera: Geometridae

Common names: geometrid moth

Host type: broadleaf

Hosts: *Eucalyptus* spp.; *Psidium guajava*

*Thyriniteina arnobia* are native Brazilian moths. The natural hosts, such as *Psidium guajava*, of these moths occur in the same plant family as eucalypts. It appears that there is an increasing preference by this moth to feed on *Eucalyptus* spp. and as such is becoming a pest of commercial plantations (de Oliveira *et al.*, 2003). In some areas *T. arnobia* makes the establishment of plants difficult.

[http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0100-67622003000600016](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0100-67622003000600016)

### **Introduced insects**

#### ***Cinara atlantica* (Wilson, 1919)**

Other scientific names:

Hemiptera: Aphididae

Common names: giant conifer aphid; pine bark aphid

Host type: conifer

Hosts: *Pinus* spp.

*Cinara* spp. have been recently detected in Brazil from 1998 to 2002 (FAO, 2005). These insects attack young plantations of *Pinus* spp affecting the form of the trees and reducing increments. The losses in height growth were estimated as 14 percent in plantations up to

2 years of age (FAO, 2005). The annual economic losses have been estimated at US\$3.8 million (FAO, 2005).

*Cinara atlantica* has been observed attacking *Pinus* spp. in southern and southeastern Brazil (Cardoso and Lázzari, 2003). This species congregates in large masses on the branches of pines. Sap is sucked from the phloem of branches and twigs. Populations of *Cinara atlantica* in Brazil present larger geographical and seasonal distributions than that of *C. pinivora* (Lázzari, Trentini and de Carvalho, 2004).

[http://www.scielo.br/scielo.php?pid=S0085-56262004000200019&script=sci\\_arttext](http://www.scielo.br/scielo.php?pid=S0085-56262004000200019&script=sci_arttext)  
[http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0085-56262003000300014](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0085-56262003000300014)  
[http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0101-81752005000300011](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0101-81752005000300011) (In Portuguese with English abstract)

### ***Cinara fresai* Blanchard**

Other scientific names:

Hemiptera: Aphididae

Common names: cypress aphid; juniper aphid

Host type: conifer

Hosts: *Pinus elliottii*

Lázzari, Trentini and de Carvalho (2004) reported the first record of *C. fresai* in Brazil in areas planted with *Pinus elliottii*.

[http://www.scielo.br/scielo.php?pid=S0085-56262004000200019&script=sci\\_arttext](http://www.scielo.br/scielo.php?pid=S0085-56262004000200019&script=sci_arttext)  
[http://www.ento.csiro.au/aicn/name\\_s/b\\_1048.htm](http://www.ento.csiro.au/aicn/name_s/b_1048.htm)  
<http://www.deh.gov.au/cgi-bin/abrs/fauna/details.pl?pstrVol=APHIDOIDEA;pstrTaxa=562;pstrChecklistMode=2>

### ***Cinara maritimae* (Dufour, 1833)**

Other scientific names:

Hemiptera: Aphididae

Common names:

Host type: conifer

Hosts: *Pinus* spp.; *P. elliottii*; *P. densiflora*; *P. thumbergii*; *P. caribae bahamensis*

*Cinara maritimae* is a significant pest of pine trees. In Brazil, this species has been found infesting *Pinus elliottii*, *P. densiflora*, *P. thumbergii*, and *P. caribae bahamensis* (Lázzari, Trentini and de Carvalho, 2004). This pest has also been recorded on *Pinus* spp. in Argentina (*P. contorta*, *P. elliottii*, *P. halepensis*, *P. pinaster*, *P. radiata*, *P. taeda*) and Chile (*Pinus radiata*).

[http://www.scielo.br/scielo.php?pid=S0085-56262004000200019&script=sci\\_arttext](http://www.scielo.br/scielo.php?pid=S0085-56262004000200019&script=sci_arttext)

### ***Cinara piniformosana* (Takahashi, 1923)**

Other scientific names:

Hemiptera: Aphididae

Common names: giant conifer aphid

Host type: conifer

Hosts: *Pinus* spp.; *P. densiflora*; *P. thumbergii*

In Brazil, *Cinara piniformosana* is known to occur on *Pinus* spp., in particular *P. densiflora* and *P. thumbergii* (Lázzari, Trentini and de Carvalho, 2004).

[http://www.scielo.br/scielo.php?pid=S0085-56262004000200019&script=sci\\_arttext](http://www.scielo.br/scielo.php?pid=S0085-56262004000200019&script=sci_arttext)

### ***Cinara pinivora* Wilson, 1919**

Other scientific names:

Hemiptera: Aphididae

Common names: giant conifer aphid

Host type: conifer

Hosts: *Pinus* spp.

*Cinara* spp. have been recently detected in Brazil from 1998 to 2002 (FAO, 2005). These insects attack young plantations of *Pinus* spp. affecting the form of the trees and reducing increments. The losses in height growth were estimated as 14 percent in plantations up to 2 years of age (FAO, 2005). The annual economic losses have been estimated at US\$3.8 million/year (FAO, 2005).

*Cinara pinivora* is a native species of North America that has entered and established in southern and southeastern Brazil (Cardoso and Lázzari, 2003). In 1996, *Cinara pinivora* was detected causing severe damage on *Pinus* trees in the counties of Cambará do Sul (RS) and Lages (SC) in southern Brazil, particularly during the winter (Lázzari, Trentini and de Carvalho, 2004). It is a sap-sucking aphid with a very short life cycle and is capable of multiplying rapidly. Some forms reproduce asexually at times and hence can quickly build up numbers. The winged forms are weak fliers, but are readily carried by the wind over considerable distances. As adults or juveniles, they do not survive off the host plant material for very long.

This aphid has caused significant damage to *Pinus taeda* and *P. elliotii* plantations in Santa Catarina and Rio Grande do Sul states in 1996 (Penteado *et al.*, 2000). This aphid species potentially poses a threat to *Pinus* plantations in Brazil.

[http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0085-56262003000300014](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0085-56262003000300014)

[http://www.scielo.br/scielo.php?pid=S0085-56262004000200019&script=sci\\_arttext](http://www.scielo.br/scielo.php?pid=S0085-56262004000200019&script=sci_arttext)

[http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0101-81752005000300011](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0101-81752005000300011) (In Portuguese with English abstract)

### ***Cinara tujafilina* (del Guercio, 1909)**

Other scientific names:

Hemiptera: Aphididae

Common names: cypress pine aphid

Host type: conifer

Hosts: Cupressaceae; *Cupressus* spp.

*Cinara tujafilina* is one of many aphid species causing economic damage to conifers in Brazil. This pest attacks species of Cupressaceae in particular *Cupressus* spp. (Lázzari, Trentini and de Carvalho, 2004)

[http://www.scielo.br/scielo.php?pid=S0085-56262004000200019&script=sci\\_arttext](http://www.scielo.br/scielo.php?pid=S0085-56262004000200019&script=sci_arttext)

[http://www.ento.csiro.au/aicn/name\\_s/b\\_1051.htm](http://www.ento.csiro.au/aicn/name_s/b_1051.htm)

<http://www.ento.okstate.edu/ddd/insects/arborvitaeaphid.htm>

***Glycaspis brimblecombei* Moore, 1964**

Other scientific names:

Hemiptera: Psyllidae

Common names: red gum lerp

Host type: broadleaf

Hosts: *Eucalyptus* spp.; *E. camaldulensis*; *E. grandis*; *E. urophylla*; *E. blakelyi*; *E. brassiana*; *E. bridgesiana*; *E. dealbata*; *E. mannifera*; *E. tereticornis*

*Glycaspis brimblecombei* is native to Australia and was possibly introduced into Brazil via nursery stock. It was detected in São Paulo State in June 2003. The infestations have caused leaf drop, dieback and stressed trees of *Eucalyptus camaldulensis*; *E. grandis* and *E. urophylla* (Wilcken *et al.*, 2003). The stressed trees are vulnerable to attack by other organisms. Other hosts include *Eucalyptus tereticornis*, *E. mannifera*, *E. dealbata* and *E. blakelyi*.

The red gum lerp as a juvenile feeds on the sap from leaves and excretes large volumes of a sugary solution. The young create finely woven shelters from the sugary solutions they excrete which protect them from the environment and predators. These insects produce large volumes of sugary solution, in excess of that required to build lerp shelters, this sugary exudate provides a substrate that enables large amounts of sooty mould to grow and blacken trees.

[http://www.eppo.org/QUARANTINE/Alert\\_List/insects/glybrim.htm](http://www.eppo.org/QUARANTINE/Alert_List/insects/glybrim.htm)

[http://www.deh.gov.au/cgi-](http://www.deh.gov.au/cgi-bin/abrs/fauna/details.pl?pstrVol=PSYLLOIDEA;pstrTaxa=369;pstrChecklistMode=1)

[bin/abrs/fauna/details.pl?pstrVol=PSYLLOIDEA;pstrTaxa=369;pstrChecklistMode=1](http://www.deh.gov.au/cgi-bin/abrs/fauna/details.pl?pstrVol=PSYLLOIDEA;pstrTaxa=369;pstrChecklistMode=1)

<http://commserv.ucdavis.edu/CESanDiego/redgumlp.pdf>

<http://www.cnr.berkeley.edu/biocon/dahlsten/rglp/index.htm>

***Sirex noctilio* Fabricius, 1793**

Other scientific names: *Sirex melanocerus* Thomson, 1871; *Paururus noctilio*

Hymenoptera: Siricidae

Common names: European wood wasp; sirex wood wasp; steel-blue horntail

Host type: conifer

Hosts: *Pinus radiata*; *P. taeda*; *P. pinaster*; *P. sylvestris*; *P. nigra*; *P. pinea*; *P. elliotii*; *P. echinata*; *P. palustris*; *P. patula*; *P. caribaea*; *P. kesiya*; *P. strobes*; *Larix* spp.; *Pseudotsuga menziesii*

The European wood wasp, *Sirex noctilio*, was discovered in Brazil in 1988 (Iede, Penteadó and Bisol, 1988) following a report of pine mortality in the northern part of Rio Grande do Sul, Brazil's southernmost state. Infestations have since spread north into the neighbouring states of Santa Catarina (1992) and Parana (1996) where extensive industrial plantations of *Pinus taeda* and *P. elliotii* are established (Mendes, 1992; Iede, Penteadó and Schaitza, 1998). As of 1998, some 250 000 ha of pine plantations were believed to be infested and the insect continued to spread.

Another estimate for damage caused by *S. noctilio* during the 1990s was around 350 to 400 thousand hectares of forest area (FAO, 2005). The wood losses were estimated at 236 250 m<sup>3</sup> (US\$4.2 million/year). The most aggressive levels of infestation occurred

from 1988 to 1992. The system of control was efficient and its result was reflected in following years (1998-2002).

Trees are killed by a combination of toxic mucus and a fungus, *Amylostereum areolatum*, both of which are inoculated into trees during egg-laying; the larvae feed on the fungus. Each generation takes between one and two years.

<http://www.metla.fi/iufro/iufro95abs/d2pos86.htm>

[http://www.forestrytas.com.au/forestrytas/pdf\\_files/forest\\_health\\_leaflets/insect\\_pests/pestsinfosheet7sirexwasp.pdf](http://www.forestrytas.com.au/forestrytas/pdf_files/forest_health_leaflets/insect_pests/pestsinfosheet7sirexwasp.pdf)

## 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.

*Armillaria* spp. have been found in *Pinus* spp. plantations in Brazil since the 1990s (FAO, 2005). The mortality level is estimated at 5.1 percent per year. In the south and southeast of Brazil, estimates of 10 percent of the total area planted with *Pinus* are affected by *Armillaria*, in different levels of attack. Losses could reach 190 000 m<sup>3</sup> of wood representing an estimated economic loss of US\$3.4 million/year. *Armillaria* cf *mellea* has been recorded from southern Brazil causing yellowing in plantations of *Pinus elliottii* and *P. taeda*.

This fungus is believed to be a complex of species that have a broad host range. It 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. Death of trees can take several years.

This species is a soil borne fungus and the rhizomorphs can grow up to 3 m 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. It may live for years in material in the ground and then infect living hosts.

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

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

#### ***Puccinia psidii* Winter**

Other scientific names:

Basidiomycota: Pucciniaceae

Common names: guava rust; eucalyptus rust

Host type: broadleaf

Hosts: Myrtaceae; *Eucalyptus* spp.

*Puccinia psidii* is a rust fungus believed to be native to areas of Central and South America. This rust fungus occurs naturally on native Myrtaceae in these regions and has moved on to introduced species of Myrtaceae such as *Eucalyptus* spp. It is known to kill significant numbers of eucalypts, particularly those in young plantations. This rust is considered to be one of the most damaging eucalypt diseases in Brazil. *P. psidii* causes damage to young foliage and flowers. Infection appears as pustules on young leaves then rapidly progresses through the flowers and young shoots. The infected parts of the plant shrivel and die and subsequent growth is stunted and distorted. Very large numbers of spores are produced which are dispersed by both air and water.

*P. psidii* has been considered as an agent for biological control of melaleuca (*Melaleuca quinquenervia*) in Florida, US.

[http://www.eppo.org/QUARANTINE/Alert\\_List/deleted%20files/fungi/Puccinia\\_psidii.doc](http://www.eppo.org/QUARANTINE/Alert_List/deleted%20files/fungi/Puccinia_psidii.doc)

[http://www.actahort.org/books/452/452\\_8.htm](http://www.actahort.org/books/452/452_8.htm)

<http://fabinet.up.ac.za/tpcp/pamphlets/pdf/eucrust.pdf>

<http://www.science.org.au/events/emergingdiseases/casestudies.htm>

### **Introduced diseases**

Disease incidence and severity varies according to the weather conditions during the year and management practices. During outdoor acclimatization and hardening, plants may become infected by fungi such as *Cylindrocladium* spp., *Rhizoctonia* spp., *Botrytis cinerea*, and *Quambalaria eucalypti*, and bacteria such as *Xanthomonas axonopodis*, *X. campestris* and *Pseudomonas cichorii* (Alfenas *et al.*, 2004). With the increasing area of eucalypt plantations in Brazil, several disease outbreaks have been reported in the past years, either in nurseries or in the field. Some of the more significant diseases are dealt with below.

#### ***Ceratocystis fimbriata* Ellis & Halst.**

Other scientific names: *Ceratostomella fimbriata*; *Endoconidiophora fimbriata*;

*Ophiostoma coffeae*; *Ophiostoma fimbriatum*; *Rostrella coffea*; *Sphaeronema fimbriata*

Ascomycota: Ceratocystidaceae

Common names: Ceratocystis wilt; black rot; Ceratocystis canker

Host type: broadleaf

Hosts: *Populus* spp.; *Eucalyptus* spp.; *Theobroma cacao*; *Ipomoea batatas*

*Ceratocystis fimbriata* is thought to be a complex of fungal species that cause a wilt disease on a wide range of host plants including aspen, cocoa, eucalypts and sweet potatoes. The fungus causes reddish-brown to purple radial stains within timber and at times cankers, although wilting may occur without cankers. Infection occurs through wounds, either naturally occurring (e.g. insect damage) or human-induced. For example, pruning of trees is likely to provide opportunity for infection. Hence, this disease poses a significant threat to intensively managed plantings of eucalypts. This fungus is able to survive adverse conditions within the host plant tissues and in soil, debris and cut timber.

Pathways for introduction include soil, cuttings, planting material, packing material and dunnage.

<http://www.apsnet.org/pd/pdfs/2004/0510-01R.pdf>

<http://www.public.iastate.edu/~tcharrin/FimbDis.html>

<http://www.public.iastate.edu/~tcharrin/CERRES.html>

<http://www.publish.csiro.au/paper/AP03032.htm>

<http://www.mycologia.org/cgi/content/abstract/97/1/57>

### ***Chrysosporthe cubensis* (Bruner) Gryzenhout & M.J.Wingfield**

Other scientific names:

Ascomycota: Incertae sedis

Common names: Eucalyptus canker

Host type: broadleaf

Hosts: *Eucalyptus* spp.; *Syzygium aromactium*

*Chrysosporthe cubensis* is a fungus that is widespread and causes disease in commercial plantations of *Eucalyptus* spp. This fungus occurs naturally on native Myrtaceae and the original host is thought to be cloves (*Syzygium aromactium*). It is now found on other species of Myrtaceae including *Eucalyptus* spp. It causes cankers which lead to breakages of limbs and trunks of trees and often mortality. Branches and trunks are weakened by the fungus and are susceptible to wind damage. Subsequent growth is stunted and distorted. This is an important disease in eucalypt plantations in Brazil and other countries as it is known to kill significant numbers of eucalypts, particularly those in young plantations.

<http://www.fao.org/docrep/006/p3565e/p3565e05.htm>

<http://www.forestryimages.org/browse/bimages.cfm?SUB=3486&area=47>

[http://fabinet.up.ac.za/personnel/docs/2004Gryzenhout\\_Studies\\_In\\_Mycology.pdf](http://fabinet.up.ac.za/personnel/docs/2004Gryzenhout_Studies_In_Mycology.pdf)

<http://fabinet.up.ac.za/tpcp/pamphlets/pdf/cryphonectria.pdf>

[http://fabinet.up.ac.za/personnel/docs/Rodas\\_Miconia.pdf](http://fabinet.up.ac.za/personnel/docs/Rodas_Miconia.pdf)

[http://www.findarticles.com/p/articles/mi\\_qa4019/is\\_200105/ai\\_n8946157#continue](http://www.findarticles.com/p/articles/mi_qa4019/is_200105/ai_n8946157#continue)

<http://www.cbs.knaw.nl/simonline/sim-050/50-11.pdf>

### ***Phanerochaete salmonicolor* (Berk. & Broome) Jülich**

Other scientific names: *Botryobasidium salmonicolor* (Berk. & Broome) Venkatar.;

*Corticium salmonicolor* Berk. & Broome; *Erythricium salmonicolor* (Berk. & Broome)

Burds.; *Pellicularia salmonicolor* (Berk. & Broome) Dastur; *Terana salmonicolor* (Berk.

& Broome) Kuntze

Basidiomycota: Phanerochaetaceae

Common names: pink disease; pink limb blight

Host type: broadleaf

Hosts: *Acacia mearnsii*; *Agathis dammara*; *Citrus* spp.; *Eucalyptus* spp.; *Mangifera* spp.;

*Podocarpus henkellii*; *P. latifolius*

*Phanerochaete salmonicolor* causes a canker and dieback disease, commonly known as pink disease, on many tree species. It is widely distributed in the tropics where it causes branch and stem cankers on a wide variety of woody hosts, primarily hardwoods, including mango, citrus, and eucalypts. The fungus is able to penetrate intact bark usually through lenticels where it may then kill the cambium or, the cambium may be infected

directly through wounds. Branches and trunks of infected trees become covered by fungal threads and then pustules develop followed by a whitish pink crust. Small branches or stems may be quickly girdled and distal portions are killed. Epicormic branches may be formed below girdling cankers which keep the tree alive. However, these may be infected and killed in future infection cycles, resulting in eventual death of the tree.

Under favourable environmental conditions, this disease can have a high infection rate and cause considerable damage including galls and dieback. Possible pathways for entry of the disease are via infected plants, timber and wood packaging. It is a waterborne and airborne fungus.

<http://spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=51&langdisplay=english>

<http://www.indexfungorum.org/Names/NamesRecord.asp?RecordID=319725>

### ***Melampsora medusae* Thuem.**

Other scientific names: *Melampsora albertensis*; *Uredo medusae*

Basidiomycota: Melampsoraceae

Common names: poplar rust

Host type: broadleaf

Hosts: *Populus* spp.

Native to North America, *Melampsora medusae* is a leaf rust fungus that has spread to Australia, Brazil, Bolivia, Japan, New Zealand and South Africa. It is an important disease in plantings of poplar in Brazil. The fungus produces pustules on the foliage, which produce urediospores in large quantities. These spores spread the disease causing epidemics during the summer. After several cycles of the pathogen, the plant is defoliated and suffers growth loss (May-De Mio and Amorim, 2000).

[http://www.eppo.org/QUARANTINE/fungi/Melampsora\\_medusae/MELMME\\_ds.pdf](http://www.eppo.org/QUARANTINE/fungi/Melampsora_medusae/MELMME_ds.pdf)

## **Other pests**

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

#### ***Cebus paella* Linnaeus, 1758**

Other scientific names:

Primata: Cebidae

Common names: brown capuchin monkey; tufted capuchin monkey; black-capped capuchin monkey

Host type: conifer

Hosts: *Pinus* spp.; *P. taeda*; *P. elliottii*; *Araucaria angustifolia*

Brown capuchins are medium-sized primates that live in northern South America. They usually live in groups of 8-18 in rainforest trees and feed on husked fruit. Recently, *Cebus apella* has found the bark of *Pinus taeda* and *P. elliottii* palatable. Feeding often girdles and kills the upper crowns of pines. Similar damage has been observed in plantations of the indigenous conifer, *Araucaria angustifolia*.

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



No information was available on the status of introduced other pests (e.g. mites, nematodes, mammals, etc.) in the planted forests of Brazil.

### **Diebacks and other conditions**

No records were available for diebacks and other conditions affecting Brazil's planted forests.

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

### **Government level**

The Centro Nacional de Pesquisa de Florestas (National Centre for Forest Research) of Empresa Brasileira Pesquisa Agrícola (EMBRAPA), with headquarters in Colombo, Parana State, conducts research and technology transfer in all aspects of forestry including management of damaging insects and diseases.

Servicio de Sanidade Vegetal (SSV, Plant Protection Department) has responsibility for the inspection of plants and plant products at ports of entry and for establishment and enforcement of plant quarantine procedures to prevent or slow the spread of alien pests that have become established in Brazil. This department has established regulations governing the shipment of logs from areas of known *Sirex noctilio* infestation to uninfested areas.

### **Monitoring and detection**

Most pest detection and monitoring are accomplished through an informal process of field surveillance by foresters and forest workers. In 2001, through a cooperative agreement between the USDA Forest Service and EMBRAPA, aerial sketch-mapping for the detection and assessment of damage caused by forest insects and diseases was introduced to Brazil. Emphasis was placed on the use of this technique for detection and assessment of tree mortality caused by *Sirex noctilio*, however it became apparent that the technique was also effective for assessment of damage to pine plantations by the brown capuchin monkey and chlorosis (yellowing) of foliage caused by a root pathogen of the genus *Armillaria* (Ciesla *et al.*, 2002; de Oliveira *et al.*, 2004).

### **Data management**

Most of the information on forest insects and diseases in Brazil is qualitative in nature. However, as a result of the introduction of aerial sketch mapping, data are being stored in a geographic information system at EMBRAPA (de Oliveira *et al.*, 2004).

### **Pest management**

Following the discovery of the wood wasp *Sirex noctilio* in Brazil, EMBRAPA Florestas adapted technology developed in Australia for early detection of infestation using trap trees baited with a herbicide, thinning of plantations to maintain tree vigour and inoculation of infested trees with a parasitic nematode, *Deladenus siricola*, which attacks the ovaries of the females wasps and renders them unable to reproduce. Nematodes are

mass reared in the laboratory in Colombo and made available to forest landowners for release.

A programme of introduction and release of parasitoids is ongoing by EMBRAPA scientists in an attempt to reduce damage in pine plantations by the conifer aphid, *Cinara pinivora*.

### Private landowners

Forest companies operating in Brazil have active programmes to protect planted forests from damaging forest pests. Many companies maintain close ties with scientists at EMBRAPA Floresta and the Universidade Federal de Vicosa and are ready to implement new techniques for managing destructive pests. Companies also help fund needed research and development. A consortium of forest companies funded much of the work carried out for the development of a pest management system for *Sirex noctilio*.

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[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)

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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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     *Glycaspis brimblecombei*, 8  
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     *Megaplatypus mutatus*, 4  
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     *Glycaspis brimblecombei*, 8  
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     *Eucalyptus blakelyi*, 8  
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- Luehea divaricata*, 4
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      - Sirex noctilio*, 8
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