

Latin America and the Caribbean

The total number of pests for the eight countries in the region was 113 (Figure 7). Insect pests comprised 77 percent of all pests reported, pathogens 11 percent and other pests 11 percent (Table 8). The other pest category included goat (*Capra hircus*), Canadian beaver (*Castor canadensis*), European rabbit (*Oryctolagus cuniculus*), brown capuchin monkey (*Cebus paella*), red deer (*Cervus elaphus*), guanaco (*Lama guanicoe*), Cape hare (*Lepus capensis*), nematode (*Subanguina chilensis*), desert spider mite (*Tetranychus desertorum*) and species of the mistletoe genera *Arceuthobium*, *Misodendrum*, *Phoradendron* and *Psittacanthus*.

Significantly more pest species were recorded in planted forests than in naturally regenerated forests. Forest pests were reported almost equally from broadleaf and conifer tree species. The pests were almost evenly split between indigenous and introduced species. Considerably more introduced pests were reported from planted forests.



Note: For the purposes of this study, Mexico has been included within Latin America and the Caribbean.

Coleoptera and Hemiptera were the most represented insect pest orders reported from almost all countries (Figure 8). The only exception was Colombia which reported a majority of lepidopteran pests. The majority of pathogens reported from the selected countries were Ascomycota species. Mistletoes (Santalales) were the most commonly reported of the other pest species followed by even-toed ungulates (Artiodactyla).

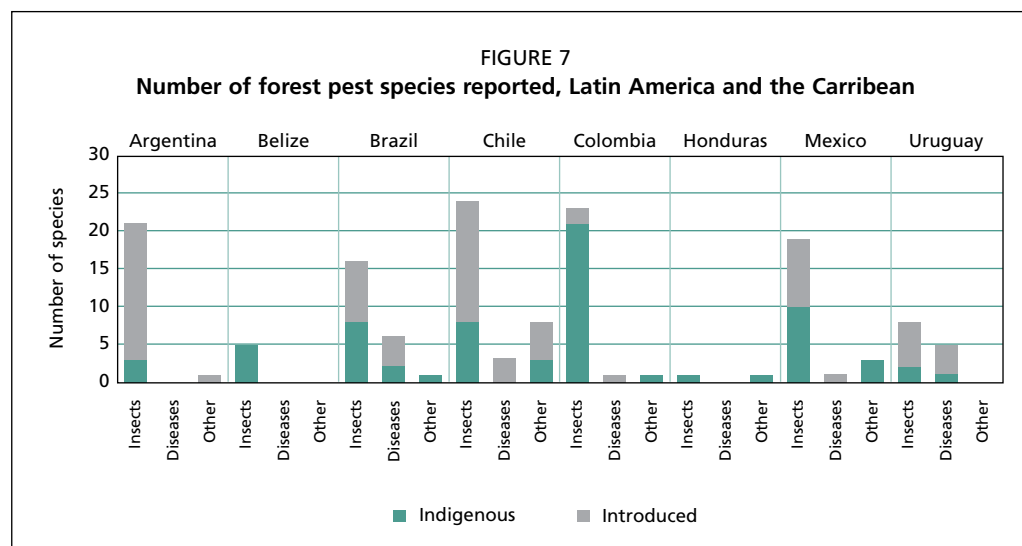
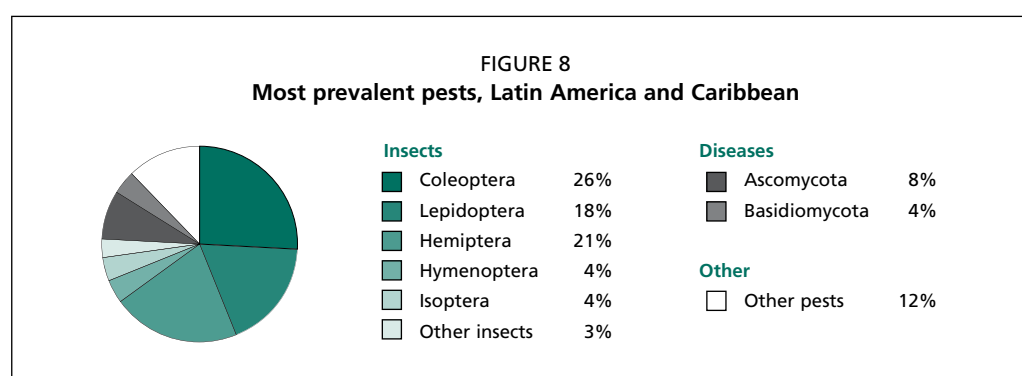


TABLE 8
Summary of the data on forest pest species, Latin American and Caribbean

Pest Type	Number of pest species						
	Total	In naturally regenerated forests	In planted forests	In both types of forest	On broadleaf	On conifer	On both host types
Indigenous species							
Insects	47	21	25	1	25	17	5
Diseases	2	0	2	0	1	1	0
Other	8	6	2	0	4	2	2
Introduced species							
Insects	40	1	33	6	13	25	2
Diseases	11	0	11	0	7	3	1
Other	5	4	1	0	2	0	3
Total	113	32	74	7	52	48	13



SPECIES FOUND IN MORE THAN ONE COUNTRY

Eight of the transboundary pests recorded in the region were of the order Hemiptera (Table 9), mostly in coniferous forests. *Ctenarytaina eucalypti* and *Glycaspis brimblecombei* were reported in planted broadleaf forests, the former in Chile, Colombia and Uruguay and the latter in Brazil, Chile and Mexico.

Aphids (*Cinara* spp.) are major pests of conifers. Fifteen species were reported, five of which occurred in more than one country (Table 9). *Cinara acutirostris*, *C. cedri*, *C. costata*, *C. juniperi*, *C. maghrebica*, *C. piceae* and *C. pilicornis* were all recorded as pests in Argentina's planted forests. *Cinara atlantica* and *C. piniformosana* were reported in planted pine forests in Brazil and *C. cupressi* was recorded in Chile's naturally regenerated forests. Both *Cinara maritima* and *C. pinivora** were noted as pests of planted pine forests in Argentina and Brazil. Naturally regenerated forests in Chile and planted forests in Argentina and Brazil were affected by both *Cinara fresai* and *C. tujafilina*.

Pine needle aphids (*Eulachnus* spp.) are found in Argentina, Chile and Colombia. *Eulachnus rileyi* infests planted forests in Argentina and Chile and both forest types in Colombia. Argentina also reported *E. tauricus* as a pest of planted forests.

The Coleoptera species reported included *Dendroctonus frontalis** as well as two pests of broadleaf trees: *Megaplatypus mutatus*, recorded in both naturally regenerated and planted forests in Argentina, Brazil, and Uruguay; and the eucalyptus longhorned borer, *Phorocantha recurva**, a major pest of planted forests in Chile and Uruguay.

Dendroctonus species are significant pests of conifers in naturally regenerated forests. Four species were recorded from the selected countries including one transboundary pest. *Dendroctonus adjunctus*, *D. mexicanus* and *D. pseudotsugae* were recorded from Mexico. The southern pine beetle, *Dendroctonus frontalis**, is a major pest in the region, reported from Belize (note the taxonomy is under review), Honduras and Mexico.

The lepidopteran pests included *Hypsipyla grandella**, *Rhyacionia buoliana* and *Sarsina violascens*. The mahogany shoot borer, *Hypsipyla grandella*, is indigenous to the region and was the most widespread pest. It was reported as a pest of planted broadleaf forests in Argentina, Belize, Brazil, Colombia, Mexico and Uruguay. Argentina and Chile reported the European pine shoot moth, *Rhyacionia buoliana*, as a major pest of planted pines. *Sarsina violascens* was reported as a pest of planted broadleaf forests, primarily attacking eucalypt species, in Argentina, Brazil and Mexico.

Three Hymenoptera species were reported from more than one country. Most notable is the European woodwasp, *Sirex noctilio**, which has caused significant damage to planted conifer forests in Argentina, Brazil, Chile and Uruguay. In Argentina and Chile, *Urocerus gigas* also attacks planted conifer forests, primarily Monterey pine, *Pinus radiata*. *Nematus desantisi* is a major pest of planted forests of *Salix* and *Populus* spp. in Argentina and Chile.

Numerous *Ips* species were recorded from the naturally regenerated pine forests of Belize and Mexico. *Ips calligraphus*, *I. grandicollis* and *I. apache* were reported as pests in Belize and *I. confusus* and *I. pini* were recorded from Mexico.

Three transboundary pathogens were reported from planted broadleaf forests in the selected countries. *Chrysosporthe cubensis** (formerly *Chryphonectria cubensis*) is known to kill significant numbers of eucalypts in Brazil and Colombia, particularly those in young plantations. *Ceratocystis fimbriata* and *Puccinia psidii* are also major pests of eucalypts in Brazil and Uruguay.

The beaver, *Castor canadensis*, and the parrot-flower mistletoe, *Psittacanthus* spp., were the other two transboundary pests recorded in the Latin American and Caribbean countries. Intentionally introduced into Argentina in 1947 for the fur industry, beavers are now having a significant impact on the structure of riparian forests in both

TABLE 9
Species in more than one country, Latin America and Caribbean

Pest species	Order/phylum: family	Countries of occurrence	Type of forest	Host type
Insects				
<i>Cinara cupressivora</i> *	Hemiptera: Aphididae	Chile, Colombia	Naturally regenerated, planted	Conifer
<i>Cinara fresai</i>	Hemiptera: Aphididae	Argentina, Brazil, Chile	Naturally regenerated, planted	Conifer
<i>Cinara maritimae</i>	Hemiptera: Aphididae	Argentina, Brazil, Chile	Planted	Conifer
<i>Cinara pinivora</i> *	Hemiptera: Aphididae	Argentina, Brazil	Planted	Conifer
<i>Cinara tujafilina</i>	Hemiptera: Aphididae	Argentina, Brazil, Chile	Naturally regenerated, planted	Conifer
<i>Ctenarytaina eucalypti</i>	Hemiptera: Psyllidae	Chile, Colombia, Uruguay	Planted	Broadleaf
<i>Dendroctonus frontalis</i> *	Coleoptera: Scolytidae	Belize, Honduras, Mexico	Naturally regenerated	Conifer
<i>Eulachnus rileyi</i>	Hemiptera: Aphididae	Argentina, Chile, Colombia	Naturally regenerated, planted	Conifer
<i>Glycaspis brimblecombei</i>	Hemiptera: Psyllidae	Brazil, Chile, Mexico	Planted	Broadleaf
<i>Hypsipyla grandella</i> *	Lepidoptera: Pyrilidae	Argentina, Belize, Brazil, Colombia, Mexico, Uruguay	Planted	Broadleaf
<i>Megaplatus mutatus</i>	Coleoptera: Platypodidae	Argentina, Brazil, Uruguay	Naturally regenerated, planted	Broadleaf
<i>Nematus desantisi</i>	Hymenoptera: Tenthredinidae	Argentina, Chile	Planted	Broadleaf
<i>Phorocantha recurva</i> *	Coleoptera: Cerambycidae	Chile, Uruguay	Planted	Broadleaf
<i>Rhyacionia buoliana</i>	Lepidoptera: Tortricidae	Argentina, Chile	Planted	Conifer
<i>Sarsina violascens</i>	Lepidoptera: Lymantriidae	Argentina, Brazil, Mexico	Planted	Broadleaf
<i>Sirex noctilio</i> *	Hymenoptera: Siricidae	Argentina, Brazil, Chile, Uruguay	Planted	Conifer
<i>Urocerus gigas</i>	Hymenoptera: Siricidae	Argentina, Chile	Planted	Conifer
Diseases				
<i>Ceratocystis fimbriata</i>	Ascomycota: Ceratocystidaceae	Brazil, Uruguay	Planted	Broadleaf
<i>Chrysosporthe cubensis</i> *	Ascomycota: Incertae sedis	Brazil, Colombia	Planted	Broadleaf
<i>Puccinia psidii</i>	Basidiomycota: Pucciniaceae	Brazil, Uruguay	Planted	Broadleaf
Other				
<i>Castor canadensis</i>	Rodentia: Castoridae	Argentina, Chile	Naturally regenerated	Broadleaf
<i>Psittacanthus</i> spp.	Santalales: Loranthaceae	Honduras, Mexico	Naturally regenerated	Broadleaf, Conifer

Argentina and Chile (FAO, 2007a). They fell many trees, and their dams result in flooding of *Nothofagus pumilio* forests, effectively killing the trees. In 2007 they swam across the Magellan Straits from Tierra del Fuego and are now establishing in one of the national parks near Punta Arenas in Chile. Reported from both Honduras and Mexico, *Psittacanthus* spp. can affect the health and vitality of host trees through growth loss, reduction in seed production and, in extreme cases, tree mortality.

CAPACITY FOR FOREST HEALTH PROTECTION

Monitoring and detection

In many of the countries, monitoring and detection activities are an informal process of field surveillance by foresters and forest workers, often carried out only in planted forests. Belize, Brazil, Chile, Honduras and Mexico carry out aerial and ground surveys to detect and assess the damage caused by specific pests.

Data management

For the most part, information on pests and pest damage in the selected countries is qualitative. When quantitative data exist, they are not available in an easily accessible format. In some countries, such as Brazil, Colombia and Honduras, data management systems have been developed as part of programmes to address specific forest pests. Uruguay has developed a national database for all pest problems that could act as a model for the region.

Consistent data on the impacts of forest pests and diseases over time are not available for Latin America and the Caribbean (FAO, 2006a). As part of the FRA 2005 process, only five of the eight countries provided some quantitative data on forest pests; no data were reported from Argentina, Colombia and Uruguay. Bark beetles were noted to have damaged approximately 70 percent of forests in the Mountain Pine Ridge Forest Reserve in Belize. Brazil reported that 50 000 ha of forest were damaged by insects for the 1990 reporting period, and 30 000 ha of forest were affected by insects and 20 000 ha by diseases for the 2000 reporting period. In Chile, insects affected 866 000 ha and 531 000 ha for the 1990 and 2000 reporting periods respectively. Diseases impacted 13 000 ha and 810 000 ha for the two reporting periods. Insects, primarily bark beetles, damaged almost 550 ha (2000) of forest in Honduras. Mexico reported over 8 000 ha and over 7 800 ha of forest damaged by insects for the 1990 and 2000 reporting periods respectively. Diseases impacted 11 000 ha and 2 000 ha of forest for the two reporting periods.

Pest management

A variety of pest management techniques from physical management to biopesticides have been used in the selected countries, primarily to deal with specific pests in planted forests and reserves. Preventative measures, such as thinning and removal of susceptible trees, and direct control methods, such as salvage removal, cut and leave and burning of infested trees, have been applied in Belize, Honduras and Mexico to address outbreaks of *Dendroctonus frontalis** and other bark beetles. The introduction and release of parasitoids has been applied in many countries against pests such as *Cinara pinivora**, *Rhyacionia buoliana* and *Sirex noctilio**.

Ownership

For the most part, private landowners and forest companies have active programmes to protect planted forests from insect pests and diseases and may bring in international experts for consultation. In countries such as Chile, Honduras and Mexico, private companies and the government work in collaboration on issues of forest health. No information was found for Argentina and Belize where the majority of forests are in the public domain.

ADDITIONAL INFORMATION

Many countries in the region recognize environmental and forest health issues. However, consistent data over time are not available with enough reliability to draw conclusions about trends in forest health in Latin America and the Caribbean.

In Central America and Mexico, the indigenous *Dendroctonus* species has been credited with the greatest losses of pine forests in Central America in the past 40 years (Vité *et al.*, 1975; Billings and Schmidtke, 2002). A regional bark beetle strategy has been prepared to address this pest.

The mahogany shoot borer, *Hyposipyla grandella**, continues to be a major problem throughout the region particularly in mahogany plantations (*Swietenia macrophylla*, *S. mahagoni*). Attempts to establish plantations of mahogany and other forest trees such as cedar (*Cedrela odorata*) and crabwood (*Carapa guianensis*) have failed in Belize, Dominica, Grenada, St. Lucia and St. Vincent because of the damage caused by this pest (Cock, 1985).

In 1995, the pink or hibiscus mealybug (*Maconellicoccus hirsutus*) was introduced in Grenada where it attacked teak (*Tectona* spp.) and Blue Mahoe (*Hibiscus elatus*) plantations but the damage was less severe than initially thought and the pest was controlled biologically by introducing a predatory wasp (C. Eckelmann, personal communication). The pest was subsequently introduced in Trinidad and Tobago, St. Kitts-Nevis and other eastern Caribbean islands. This insect is capable of feeding on 125 to 150 different plant species, posing a severe threat to natural mixed tropical forests as well as vegetable crops and ornamental plants in the region (FAO, 2001).

Hurricanes are a regular occurrence in the region, particularly in Central America and the Caribbean, and the impacts can be devastating. In areas where the centre of the storm passes, entire forests can be blown down, trees uprooted or damaged. Following a hurricane, forests can become more susceptible to forest pests, diseases and other problems such as vines. Forest fires, especially in semi-evergreen and dry forest types, are also a problem in the region and increase the susceptibility of forest trees to attack by insect pests and diseases.

REGIONAL PEST MANAGEMENT EFFORTS

IPPC regional plant protection organizations that help prevent the spread and introduction of pests and promote appropriate control measures include: Comité de Sanidad Vegetal del Cono Sur (COSAVE), Comunidad Andina (CA), Caribbean Plant Protection Commission (CPPC) and Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA).

Following the discovery of *Sirex noctilio** in Uruguay in 1986 and its spread to Argentina, Brazil and Chile, these countries agreed to work together to combat pests that affect regional trade. In 2008, with the assistance of FAO, these countries, together with Paraguay and Bolivia, established a network for integrated and dynamic forest pest management in the Southern Cone, Red de Países del Cono Sur sobre Especies Exóticas Invasoras a Ambientes Forestales (www.fao.org/forestry/52502).