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OVERVIEW OF FOREST PESTS

MOROCCO

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DISCLAIMER

The aim of this document is to give an overview of the forest pest[1] situation in Morocco. 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.

[1] 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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MOROCCO

Introduction

Forests cover approximately 10 percent of the total land area (4.4 million hectares) of Morocco (FAO, 2006). Other wooded lands cover 406 000 ha (FAO, 2006). In 2005 it was estimated that planted forests cover approximately 563 000 ha representing percent of the total 12.5 percent of the total forest area (FAO, 2006).

Virtually all of Morocco's forests are confined to the Atlas Mountains, a series of high ranges in the northern part of the country that parallel the Mediterranean Sea. Principal tree species include *Quercus* spp., *Cedrus atlantica*, *Argania spinosa*, *Juniperus* spp., *Tetraclinis articulata, Pinus halepensis* and *Abies marocana.*

Damage caused by forest insects in 2000 was estimated at 37 206 ha (FAO, 2004c). Drought is considered a significant problem in Moroccan forests.

Forest pests

Naturally regenerating forests

Insects

Indigenous insects

***Lymantria dispar* Linnaeus, 1758**

Other scientific names: *Porthetria dispar*; *Ocneria dispar*; *Porthetria umbrosa*; *Porthetria hadina*; *Bombyx dispar*; *Liparis dispar*
Lepidoptera: Lymantriidae
Common names: gypsy moth
Host type: broadleaf
Hosts: *Quercus* spp.; *Quercus suber*; *Populus* spp.

The gypsy moth is a destructive defoliator of a wide range of broadleaf trees including fruit trees, and can be especially damaging to cork oak (*Quercus suber*). Outbreaks generally occur in stands where primary hosts (*Quercus* spp. and *Populus* spp.) comprise at least 20 percent of the basal area. Gypsy moth populations can occur at low levels for many years without causing significant damage. Tree mortality sometimes occurs when there are several sequential outbreaks that cause severe defoliation of trees. Frequently outbreaks coincide with periods when the trees are under stress. Outbreaks typically last for about three years and collapse when host trees are weakened to the point that they produce little or no foliage for the larvae to feed upon in the following spring. At times high levels of parasitism may cause outbreaks to collapse.

Pathways of entry of gypsy moth include vehicles, camping equipment, nursery stock, ships, and equipment that has been exposed for a period to the outdoors. Adults of Asian strains are capable of flight and thus have strong dispersal ability whereas females of European strains are not capable of flight. Young larvae can move some distance by ballooning from the tops of trees.
http://www.issg.org/database/species/ecology.asp?si=96&fr=1&sts=sss

http://www.invasive.org/browse/subimages.cfm?sub=165
http://www.aphis.usda.gov/lpa/pubs/fsheet_faq_notice/fs_phasiangm.html
http://www.inra.fr/dpenv/ld-dyn-e.htm

***Thaumetopoea bonjeani* Powell, 1922**

Other scientific names:
Lepidoptera: Thaumetopoeidae
Common names: processionary caterpillar
Host type: conifer
Hosts: *Cedrus atlantica*

High elevation forests of *Cedrus atlantica* are subject to periodic outbreaks of *Thaumetopoea bonjeani* (Schmidt, Mirchev and Tsankov, 1997). This insect is similar in life history and habits to the pine processionary caterpillar (*T. pityocampa*), a major pest of pines throughout the Mediterranean regions of Europe and North Africa. The larval stage of this insect is active during the winter months. The larvae live in colonies in silken tents and possess urticating hairs that can be irritating to humans and domestic animals. Defoliation reduces growth and, in extreme cases, can cause tree mortality.

***Thaumetopoea libanotica* Kiriakoff & Talhouk, 1975**

Other scientific names:
Lepidoptera: Thaumetopoeidae
Common names: cedar processionary caterpillar
Host type: conifer
Hosts: *Cedrus* spp.

Introduced insects

No records were available of introduced insects affecting naturally regenerating forests in Morocco.

Diseases

Indigenous diseases

No records were available of indigenous diseases affecting Morocco's naturally regenerating forests.

Introduced diseases

No records were available of introduced diseases affecting Morocco's naturally regenerating forests.

Other pests

Indigenous other pests

***Macaca sylvana* Linnaeus, 1758**

Other scientific names:
Primates: Cercopithecidae
Common names: Barbary ape; Barbary macaque; rock ape
Host type: conifer
Hosts: *Cedrus atlantica*

Barbary macaques are a problem in the Moyen Atlas Mountains as they strip the bark of *Cedrus atlantica* in search of water and sugars, particularly as water resources are limited and protected from monkeys. Symptoms of damage include needles turning colour and falling, followed by rapid drying and dieback of individual branches from the crown downwards. Apparently the tree does not die and symptoms differ from the dieback being studied.

Barbary macaques are a protected species and a great tourist attraction, which is important, as attempts are being made to increase the area of the recently designated national park and to promote ecotourism. Unfortunately due to the very high number of macaques in this region (17 000 – approximately 74 percent of the world's population) there is considerable pressure on the trees including damage to the regenerations.
http://animaldiversity.ummz.umich.edu/site/accounts/information/Macaca_sylvanus.html
http://www.arkive.org/species/GES/mammals/Macaca_sylvanus/more_info.html

Introduced other pests

No records were available of introduced other pests (i.e. mites, nematodes, mammals, etc.) affecting Morocco's naturally regenerating forests.

Diebacks and other conditions

Decline and dieback of naturally regenerating forests of *Quercus ilex* and *Q. suber* have been reported (FAO, 2004b). Declines can be caused by a number of factors including insect defoliation, drought, root pathogens and secondary insects. Symptoms include reduced growth, thinning and yellowing of the foliage, branch dieback and in some cases, tree mortality.

Currently there is a significant dieback affecting both natural and planted forests of *Cedrus atlantica*, which is native to Morocco and Algeria, representing the world's genetic base for Atlantic cedars. In the Atlas Mountains it is a very important species serving both a productive and protective function with an estimated 120 000 hectares. All forests in Morocco are state owned but many people live in and off the forest.

Notable dieback symptoms were recently reported in 2001 but records go back several decades to 1940 when a severe drought caused death of the cedars presumably with comparable dieback symptoms. Present dieback symptoms occur from the crown downwards and include needle discolouration, followed in rapid succession by needle drying and falling, branch drying, bark curling and in some cases, secondary insect and disease infestations. Death of the tree frequently occurs.

Many factors may be implicated in this dieback phenomenon such as temperature fluctuations including drought and temperature extremes, water shortage, management and silviculture practices, overgrazing, removal of lower branches for winter fodder, soil

types, and insects and disease, either as primary or secondary agents. Symptoms have progressively worsened in the last five years and all diameter and age classes are affected with apparently no noticeable difference related to growing aspect. Tree mortality is clumped but scattered and adjacent trees exhibit no symptoms. In the forests of Azrou, 3 400 hectares of 15 000 hectares are reported to be affected.

Planted forests

Some of the same insects that affect naturally regenerating forests also damage planted forests in Morocco.

Insects

Indigenous insects

Orthotomicus erosus (Wollaston, 1857)

Other scientific names: *Bostrichus duplicatus* Ferrari; *Bostrichus laricis* Perris; *Ips erosus* (Wollaston); *Ips erosus* var. *robustus* Knotek; *Tomicus erosus* Wollaston; *Tomicus rectangulus* Eichoff
Coleoptera: Scolytidae
Common names: European bark beetle; Mediterranean pine beetle; Mediterranean pine engraver beetle
Host type: conifer
Hosts: *Pinus* spp.

Orthotomicus erosus is a bark beetle that kills pines planted at low elevations and on dry sites. This insect appears to be most common from mid-summer to late fall. It primarily attacks *Pinus* spp., but will attack other genera of conifers. Generally it attacks freshly fallen trees or trees that are under stress, particularly those under drought stress. Attacks on stressed trees frequently leads to death of the tree.
http://www.barkbeetles.org/exotic/oreross.html
http://www.issg.org/database/species/ecology.asp?si=787&fr=1&sts
http://spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=9&langdisplay=english
http://www.ncrs.fs.fed.us/pubs/jrnl/2004/nc_2004_Haack_001.pdf
http://tncweeds.ucdavis.edu/products/gallery/orter1.html

Thaumetopoea pityocampa Denis & Schiffermüller, 1775

Other scientific names: *Bombyx pityocampa*; *Cnethocampa pityocampa*; *Thaumetopoea wilkinsonii*
Lepidoptera: Notodontidae
Common names: pine processionary caterpillar
Host type: conifer
Hosts: *Pinus* spp.; *P. pinea*; *P. pinaster*; *P. nigra*; *Cedrus atlantica*; *Larix decidua*

One of the most important insect pests of pine species planted in Morrocan forests is the pine processionary caterpillar. This insect is a winter defoliator that constructs large tents in host trees. The mature larvae have urticating hairs which can cause severe skin irritation in both humans and domestic animals. It is therefore considered not only a

forest pest but also a pest of public health importance. This species causes defoliation particularly of young plants and they cause tree stress, predisposing them to attack by other agents including infestation by secondary invasive species. Although adult trees are rarely killed by this species, damage tends to reduce growth rates hence resulting in production losses. *Thaumetopoea pityocampa* feeds on *Cedrus atlantica*, *Larix decidua* and a number of pine species including *Pinus pinea*, *P. pinaster* and *P. nigra*. The rate of survival of this insect varies depending upon which species of plant it feeds, i.e. it is higher for *Pinus sylvestris* and *Pinus nigra*.

Two egg parasitoids, *Baryscapus servadeii* (Dom.) and *Ooencyrtus pityocampae* (Mercet) are known to exert some level of natural control of this insect in Morocco (Schmidt, Mirchev and Tsankov, 1997).

Pathways of introduction of this species include movement of nursery stock and soil. The adults are reasonably strong fliers and are thus capable of natural dispersal to new areas.
http://www.eppo.org/QUARANTINE/insects/Thaumetopoea_pityocampa/THAUPI_ds.pdf
http://www.invasive.org/browse/subject.cfm?sub=4531

Introduced insects

Leptocybe invasa Fisher and LaSalle, 2004

Other scientific names:
Hymenoptera: Eulophidae
Common names: blue gum chalcid
Host type: broadleaf
Hosts: *Eucalyptus* spp.; *E. botryoides*; *E. bridgesiana*; *E. deanei*; *E. camaldulensis*; *E. globulus*; *E. gunii*; *E. grandis*; *E. robusta*; *E. saligna*; *E. tereticornis*; *E. nitens*; *E. viminalis*

Native to Australia, the blue gum chalcid is present on *Eucalyptus* spp. in Morocco. This insect is also causing problems in planted eucalypt forests in Kenya, Tanzania, New Zealand and Uganda. This gall wasp is known to attack at least 10 species of eucalypts including *E. botryoides*, *E. bridgesiana*, *E. camaldulensis*, *E. globulus*, *E. gunii*, *E. grandis*, *E. robusta*, *E. saligna*, *E. tereticornis* and *E. viminalis*. *Leptocybe invasa* produces galls on the leaf midribs, petioles and twigs; these are female galls (Mendel *et al*., 2004). The male from this species is not known. High levels of attack by this wasp causes leaf fall and repeated attacks can lead to stunted shoot growth.

Possible pathways of introduction include movement of nursery stock. The adult wasps are very small and are thus incapable of long distance flight.
http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/x5387e/x5387e07.htm
http://www.hortnet.co.nz/publications/nzpps/proceedings/00/00_339.pdf
http://www.wrm.org.uy/bulletin/74/AF.html#Kenya
http://fabinet.up.ac.za/tpcp/newsletters/TPCP_Newsletter_Nov_2005.pdf

Phoracantha recurva Newman, 1840

Other scientific names:

Coleoptera: Cerambycidae
Common names: longicorn beetle
Host type: broadleaf
Hosts: *Eucalyptus* spp.

Native to Australia, *Phoracantha recurva* was reported from Tunisia in 1999 and is believed to be also present in Morocco. It has also been recorded in Argentina, Brazil, Chile, Greece, Malawi, New Zealand, South Africa, Spain, the United States, Uruguay and Zambia. This insect is primarily a pest of stressed trees, particularly water stressed trees; it rarely attacks healthy trees. The larvae tunnel under the bark and in the cambium layer and effectively ring barks the trees. Hence the trees can die fairly rapidly after infestation occurs. Female beetles are attracted to stressed trees or freshly cut wood to lay eggs.

Pathways of introduction include nursery stock, freshly cut timber, and timber and wood with high moisture content. The adults are moderately long lived and are strong fliers that are thus capable of naturally dispersing a fair distance.
http://www.eppo.org/QUARANTINE/Alert_List/insects/phoracantha.htm
http://www.invasive.org/browse/subimages.cfm?sub=12355
http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7425.html

***Phoracantha semipunctata* (Fabricius, 1775)**

Other scientific names:
Coleoptera: Cerambycidae
Common names: common eucalypt longhorn; eucalypt longhorn; eucalyptus longhorned borer; longicorn beetle
Host type: broadleaf
Hosts: *Eucalyptus* sp.

Native to Australia, *Phoracantha semipunctata* is a large black and yellow longicorn beetle that lays eggs under loose bark of *Eucalyptus* spp. This species tends to attack unhealthy or stressed trees (particularly drought stressed trees) or freshly felled timber. The larvae tunnel deep into the trees and form galleries. The larval feeding can girdle trees killing them. They cause significant damage to the timber of affected trees, hence affecting the quality of salvaged materials. The adults live for several weeks and larvae take 2 to 6 months to develop depending on moisture conditions in the logs.

The adults of this species are strong fliers, hence can disperse significant distances. However movement over greater distances occurs in infested timber.
http://www.ento.csiro.au/aicn/system/c_616.htm
http://www.invasive.org/browse/subimages.cfm?sub=394
http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7425.html

Diseases

Indigenous diseases

No records are available of indigenous diseases affecting Morocco's planted forests.

Introduced diseases

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Other pests

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Diebacks and other conditions

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Capacity for forest health protection

Government level

More than 90 percent of the forest area of Morocco is in public ownership. Overall responsibility for the management and protection of Morocco's forests is assigned to the Direction du Dévelopment Forestier, Haut Commissariat aux Eaux et Foret et a Lutte Contre la Desertification (FAO, 2004b).

Monitoring and detection

For monitoring outbreaks of pine processionary caterpillar (*Thaumetopoea pityocampa*), the following methods have been used in Morocco: mapping of winter nests, application of pheromone traps, determination of the diapause rate, and prediction of the level of infestation (Schmidt, Mirchev and Tsankov, 1997).

Data management

Much of the data available on pests affecting trees and forests in Morocco is qualitative. However, statistical data on areas of defoliation and decline are available (FAO, 2004b).

Pest management

Aerial application of both chemical and microbial insecticides has been carried out for control of the pine processionary caterpillar (*Thaumetopoea pityocampa*) since 1979. Insecticides used include the bacterium *Bacillus thuringiensis* (Bt) and diflubenzuron, a chemical that interferes with the moulting process of the larvae. An average of 10 000 to 15 000 ha/year are treated according to economic and ecological criteria and constraints as well as consideration of tourism requirements (Schmidt, Mirchev and Tsankov, 1997).

Private landowners

Virtually all forest lands in Morocco are in public ownership, hence the role of private forest landowners in forest protection is minimal.

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