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OVERVIEW OF FOREST PESTS

KYRGYZ REPUBLIC

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DISCLAIMER

The aim of this document is to give an overview of the forest pest[1] situation in the Kyrgyz Republic. 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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KYRGYZ REPUBLIC

Introduction

In 2005 the forest cover of the Kyrgyz Republic was estimated at 869 300 ha representing 4.5 percent of the country's total land area (FAO, 2006). Other wooded lands cover another 312 800 ha (FAO, 2006).

Planted forests cover approximately 66 000 ha representing 7.6 percent of the total forest area (FAO, 2006). The remoteness from human settlements and inaccessibility provide an opportunity to carry out forest plantations. Lack of planted forest management results in accumulation of mature forests. This increase in the age of planted forests leads to susceptibility to pests and diseases.

Forests are the national wealth in the Kyrgyz Republic. They are all property of the State and in spite of the small area, forests play an important role in the development of the economy and improvement of the environment.

The Kyrgyz Republic is a mountainous country; almost 90 percent of the territory is 1000 meters above sea level. There are four types of forests: spruce forests (dominant species is *Picea shrenkiana*); walnut-fruit forests (*Juglans regia*, *Malus* spp., *Prunus* spp.); juniper (Artcha) forests (*Juniperus* spp.) growing up to 3 200m in extremely dry conditions; and shrubs and riverside forests (mainly *Salix* spp.). In the north of Kyrgyzstan, forests are mainly composed of spruce, poplar and willow trees, while in the south of the country, where the climate is drier and protected from northern winds, forests are composed of a mix of walnut, maple, apple, cherry, plum, hawthorn and almond trees.

Kyrgyzstan is highly rich in species; with just 0.13 percent of the world's land mass, it hosts nearly 1 percent of all known species. However, experts point to the fact that a number of rare and valuable ecosystems have nearly disappeared and as a result, Kyrgyzstan's forest area has decreased by almost one-third since 1930. This decrease in forest reserves was caused primarily by improper selection of timber harvesting methods, in particular clear-cutting, haphazard and unregulated grazing of livestock, and hay mowing in forest areas.

In an effort to remedy the situation, the government has banned all logging in forests since 1982, except for measures necessary to conservation. As a result, annual timber volume, as received by state forestry enterprises, amounts about 50 000 cubic meters, which cannot satisfy the needs of the population and national industries. Illegal cutting and overgrazing also represent a threat to forests.

Government forestation efforts from 1999 through 2003, the creation of new forests reserve areas, and the transformation of former agricultural lands into state forests has increased the total area of state forest reserves to 259.7 thousand hectares. This is augmented by 262.1 thousand hectares of the national nature parks. In total, 16.4 thousand hectares have been reforested from 1998 until 2003. Since 1948 more than 200 000 hectares of forests have been planted throughout the Republic in a concentrated effort to conserve, reforest, and expand the nation's forested areas.

While little quantitative data is available on the impacts of insects and diseases on forests in the Kyrgyz Republic, one report estimated that the average annual area affected by insects was 60 000 ha and 10 000 ha by diseases (FAO, 2005).

Forest pests

Naturally regenerating forests

Detailed information on the naturally regenerating forests of the Kyrgyz Republic can be found in Annex 1.

Insects

Indigenous insects

The main pests of the walnut-fruit forests of Kyrgyzstan are *Lymantria dispar*, *Erannis defoliaria*, *Malacosoma parallela*, *Yponomeuta malinellus*, *Yponomeuta padellus*, *Sphaerolecanium prunastri, Malacosoma parallela, Erschoviella musculana* and *Caliroa cerasi*. Other widespread pest species in these forests include *Hylesinus prytenskyi, Xyleborus saxeni, Aeolesthes sarta, Scolytus mali, Hylesinus tupolevi* and *Rhopalopus nadari.*

Anthaxia conradti, *Phloeosinus turkestanicus* and *Megastigmus validusi* are the most important and widespread pests of the juniper forests of southern Kyrgyzstan.

***Anthaxia conradti* Sem.**

Other scientific names:
Coleoptera: Buprestidae
Common names:
Host type: conifer
Hosts: *Juniperus* spp.

Anthaxia conradti is currently found in the juniper forests and national parks throughout southern Kyrgyzstan.

***Aonidia isfarensis* Borchs**

Other scientific names:
Hemiptera: Diaspididae
Common names:
Host type: conifer
Hosts: *Juniperus* spp.

Aonidia isfarensis attacks the seeds of juniper trees.
http://zipcodezoo.com/Animals/A/Aonidia_isfarensis.asp

***Argyresthia praecocella* Zeller, 1839**

Other scientific names:
Lepidoptera: Argyresthiidae

Common names: juniper berry miner moth
Host type: conifer
Hosts: *Juniperus* spp.

Argyresthia praecocella attacks and destroys the seeds of juniper trees.
http://www2.nrm.se/en/svenska_fjarilar/a/argyresthia_praecocella.html

***Caliroa cerasi* Linnaeus, 1758**

Other scientific names: *Caliroa limacina*
Hymenoptera: Tenthredinidae
Common names: pear slug; cherry slug; pear slugworm; cherry slugworm; cherry sawfly; pear sawfly; black-and-yellow sawfly
Host type: broadleaf
Hosts: *Crataegus* spp.; *Prunus* spp.

Damage from pear slugs occurs most often in the upper leaves of the trees and migrates downward. The larvae feed on the upper surface of leaves removing the green epidermis, skeletonizing them, and leaving only a network of veins. Pear slug damage occurs in two peaks during the year, coinciding with the presence of full-grown larvae. Though the damage can be unattractive, pear slugs generally cause little economic losses. However, on occasions infestations become so great that susceptible plants can be completely defoliated. Such extreme defoliation results in poor quality and low yields of fruit and can quickly weaken and kill newly planted trees.

The preferred hosts of *Caliroa cerasi* are pear and cherry although it also attacks plum, hawthorn, buttonbrush and mountain ash.
http://www.ento.csiro.au/aicn/name_s/b_765.htm
http://www.agf.gov.bc.ca/cropprot/tfipm/pearslug.htm
http://ag.arizona.edu/urbanipm/insects/pearslugs.html
http://www.cabicompendium.org/NamesLists/FC/Full/ERICLI.htm
http://cru.cahe.wsu.edu/CEPublications/eb1369/eb1369.html

***Capnodis sexmaculata* Ball.**

Other scientific names:
Coleoptera: Buprestidae
Common names: peach capnodis
Host type: broadleaf
Hosts: *Pistacia* spp.

http://www.forestryimages.org/browse/subimages.cfm?SUB=10164

***Capnodis tenebricosa* (Olivier, 1790)**

Other scientific names:
Coleoptera: Buprestidae
Common names: peach capnodis
Host type: broadleaf
Hosts: *Pistacia* spp.

Carphoborus persicus

Other scientific names:
Coleoptera: Scolytidae
Common names:
Host type: broadleaf
Hosts: *Pistacia* spp.

Carphoborus persicus is one of the main pest species of the pistachio forests in Central Asia. This insect damages the branches and crowns of pistachio trees (Romanenko, 1984; Toktoraliev, 1993). At the moment, this species is spreading primarily in the naturally regenerating forests in southern Kyrgyz Republic.

***Carpocapsa pomonella* L.**

Other scientific names:
Lepidoptera: Torticidae
Common names: codling moth
Host type: broadleaf
Hosts: *Malus* spp.

The codling moth is a very serious pest of apples, but the larvae may also attack pears, crabapples, English and black walnuts, quince and other fruits. The larva typically tunnels to the core of the apple, greatly lowering the market value and storage quality of the fruit, as well as making it unfit for people to eat.

***Contarina* spp.**

Other scientific names:
Diptera: Cecidomyiidae
Common names:
Host type: conifer
Hosts: *Juniperus* spp.

Contarina spp. attack and destroy the seeds of juniper trees.

***Erannis defoliaria* (Clerck, 1759)**

Other scientific names: *Hybernia defoliaria* (Clerck)
Lepidoptera: Geometridae
Common names: mottled umber moth
Host type: broadleaf
Hosts: *Malus* spp.; *Crataegus* spp.; *Quercus* spp.

Erannis defoliaria is a significant pest in the walnut-fruit forests of southern Kyrgyzstan. Outbreaks have become more severe since 1985–1987 (Amankylova, 1987). Outbreak areas have covered 500 to 3 000 ha (State Forest Service, 2004).

This species can cause severe defoliation and successive defoliations over several years can cause growth loss, branch dieback and eventual tree mortality. This insect occurs throughout Europe, from the British Isles, north to Norway, Sweden and Finland, east to

Russia and the Republic of Georgia. It was introduced into North America on the Pacific side many years ago.

E. defoliaria has one generation a year. Adults are active in autumn (October). After mating, females, which are wingless, crawl up the host trees and deposit eggs, either singly or in small groups in bark crevasses, under moss or in other sheltered places. Individual females can lay 300-400 eggs. Eggs are the overwintering stage. The larvae hatch in the spring and feed openly on the buds and foliage of host trees. Later they bind leaves together with silken webbing. When the larvae are not actively feeding, they remain inside this shelter. Pupation occurs in the soil.

Adult females are wingless and incapable of flight. Therefore, the major agent of dispersal is ballooning of early instar larvae by air currents. This insect could be spread over long distances by egg masses hidden in logs destined for export.
http://www.invasive.org/browse/subject.cfm?sub=9719
http://www.spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=160&langdisplay=english

***Erschoviella musculana* (Ershov)**

Other scientific names: *Nycteola musculana* Ershov; *Sarrothripus musculana* Ershov
Lepidoptera: Noctuidae
Common names: walnut moth; Asian walnut moth
Host type: broadleaf
Hosts: *Juglans regia*

Erschoviella musculana is considered the most important pest of walnuts in Central Asia where outbreaks occur in valley and mountain forests and orchards at elevations of 1900-2100m. It occurs in southern Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, and probably Afghanistan and Iran. The Asian walnut moth attacks both wild and cultivated varieties of the Persian or English walnut, *Juglans regia*. Larval feeding damages the nuts and one larva can destroy several nuts. Even when larvae feed only in the pericarp, the fruits are deformed and do not produce normal nuts. Reductions of walnut yields as high as 70-80 percent can occur. In addition to reduced nut crops, this insect can cause shortages of seeds needed for regeneration of natural *Juglans regia* forests. During years of low nut production, larval feeding in shoots will cause shoot mortality; this is usually more serious on young trees.

An economic assessment of the impact of *Erschoviella musculana* from 1986-1988 in Kyrgyzstan indicated that losses for the walnut growing enterprise "Arslanbob" were between 25 500 and 52 000 rubles per year. In planted forests, damage to young sprouts was up to 60 percent and damage to fruits up to 8 percent. In naturally regenerating forests, damage to young sprouts was approximately 1 percent and damage to nuts was as high as 42 percent (Romanenko, 1984). Until recently this pest was known as *Sarrothripus muscullana* and has been given a new Russian name of *Orehovaya nikteolina* (Djaparov, 2002).
http://www.spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=142&langdisplay=english
http://www.eppo.org/QUARANTINE/insects/Erschoviella_musculana/ERSHMU_ds.pdf

http://www.invasive.org/browse/subimages.cfm?sub=10978

***Eurytoma plotnikovi* Nik.**

Other scientific names:
Hymenoptera: Eurytomidae
Common names:
Host type: broadleaf
Hosts: *Pistacia vera*

Eurytoma plotnikovi damages pistachio seeds. Each year in the Kyrgyz Republic, the forest farmers have had problems with the seeds leading to a loss of quality of pistachio and subsequently economic losses.

***Hylesinus prytenskyi* Socan.**

Other scientific names:
Coleoptera: Scolytidae
Common names:
Host type: broadleaf
Hosts: *Prunus* spp.; *Juglans* spp.

***Hylesinus tupolevi* Stark.**

Other scientific names:
Coleoptera: Scolytidae
Common names:
Host type: broadleaf
Hosts: *Prunus* spp.

***Lymantria dispar* Linnaeus, 1758**

Other scientific names: *Bombyx dispar*; *Hypogymna dispar*; *Liparis dispar*; *Ocneria dispar*; *Phalaena dispar*; *Porthesia dispar*; *Porthetria dispar*; *Porthetria hadina* Butler, 1881; *Porthetria umbrosa* Butler, 1881
Lepidoptera: Lymantriidae
Common names: Asian gypsy moth; gypsy moth
Host type: broadleaf
Hosts: *Pistacia* spp.; *Juglans* spp.; *Malus* spp.; *Crataegus* spp.

The gypsy moth is one of the most important forest insect pest species in Central Asia. In naturally regenerating forests of the Kyrgyz Republic, this species attacks pistachio, walnut, apple and hawtorn trees and in planted forests it is known to infest walnut, apple and hawtorn trees. Larvae of this moth defoliate large areas of the walnut-fruit forest stands annually. Since the early 1980s the annual outbreak area has ranged from 10 000 to 52 000 ha (Ashimov, 1989; Orozumbekov, 2003). Defoliation of the walnut-fruit forests has significantly decreased the pistachio, walnut and apple harvests resulting in major economic losses. Since these forests are also important for the prevention of watershed erosion, such damage also presents significant environmental problems.

This species of moth can occur at low levels in forests for many years without causing significant damage. However, at times there are significant outbreaks that cause severe defoliation of trees, which can cause tree mortality. 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 the following spring for the next generation of larvae. High levels of parasitism can also cause outbreaks to collapse.

Adults of Asian strains are capable of flight, hence dispersal over large areas is possible and the risk of introduction to new areas is increased. Females of European strains cannot fly. Young larvae can move some distance by ballooning from tops of trees. Human activities can also facilitate the movement of this pest. Some of the pathways include vehicles, camping equipment, nursery stock, ships, vehicles, and equipment that have been exposed for a period to the outdoors.
http://www.issg.org/database/species/ecology.asp?si=96&fr=1&sts=sss
http://www.inspection.gc.ca/english/sci/surv/data/lymdise.shtml
http://www.forestpests.org/subject.html?SUB=165
http://www.padil.gov.au/viewPest.aspx?id=342
http://www.padil.gov.au/viewPestDiagnosticImages.aspx?id=342
http://www.forestry.ubc.ca/fetch21/FRST308/lab5/lymantria_dispar/gypsy.html

Malacosoma parallela Staudinger

Other scientific names:
Lepidoptera: Lasiocampidae
Common names: mountain ring silk moth; mountain tent caterpillar
Host type: broadleaf
Hosts: *Malus* spp.; *Crataegus* spp.; *Prunus* spp.

Malacosoma parallela is an important defoliator of many deciduous trees in many countries of the former USSR. It occurs in the Near East and Central Asia including northern Iran, eastern Kazakhstan, Kyrgyzstan, Uzbekistan, Syria, Tajikistan, Turkey and Turkmenistan. It has also been reported from Armenia, Russia, including the northern Caucasus, Dagestan, Chechnya and European Turkey.

Outbreaks of this pest were recorded in the walnut-fruit forests of the Kyrgyz Republic in 1985-1987 (Toktoraliev, 2003). Population levels of this insect have been at low levels according to annual forecasts (State Forest Service, 2004).

M. parallela has a wide host range and feeds on many species of shrubs and woody plants, including many of importance in agriculture, arboriculture and forestry. Defoliation can result in growth loss, branch dieback, tree mortality and changes of species composition in favour of non-host species. Another effect of defoliation is reduced seed crops of host plants, which can affect natural regeneration. Moreover, many wildlife species dependent on seed and nut crops for food could be indirectly affected by outbreaks. Damage may be caused by this species alone, or in association with other defoliators such as *Yponomeuta padellus*, *Euproctis kargalica*, *Erschoviella musculana*, and *Lymantria dispar*. Attacks may result in serious changes in the environment over large areas, including problems of erosion.

Outbreaks often last for two consecutive years. It was particularly noted as a very dangerous pest of oak in the mountains of Armenia and of forests, fruit trees and shrubs of *Rosaceae*, *Fagaceae* and *Elaeagnaceae* in the mountains of Tajikistan. It attacks both stressed and healthy trees of different ages. Outbreaks occur throughout large mountain areas, often resulting in 100 percent defoliation and sometimes leading to the death of trees and forests. The main outbreaks of *M. parallela* occur in mountain forests at an altitude of 1000–1800m where the pest finds optimal conditions for its development. It can occur up to 2 400m. *Malacosoma parallela* has one generation per year and overwinters in the egg stage.

Both males and female adults are capable of flight. Because this insect is a tent-making caterpillar and larvae feed gregariously, they are not highly subject to dispersal by air currents, nor are wind-dispersed larvae likely to survive even if they land on a suitable host plant. Opportunities for human assisted transport are judged to be limited because life stages and larval tents are conspicuous and easily detected on plant materials destined for export. Moreover, this insect is not likely to survive a long ocean journey as a hitchhiker except possibly in the egg stage.
http://www.eppo.org/QUARANTINE/insects/Malacosoma_parallela/DSMALAPA.pdf#search=%22Malacosoma%20parallela%22
http://www.spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=140&langdisplay=english
http://www.invasive.org/browse/subimages.cfm?sub=10983

***Megastigmus certus* Nikol'skaya**

Other scientific names:
Hymenoptera: Torymidae
Common names:
Host type: conifer
Hosts: *Juniperus* spp.

Megastigmus certus attacks the seeds of juniper.

***Megastigmus juniperi* Nikol'skaya, 1952**

Other scientific names:
Hymenoptera: Torymidae
Common names:
Host type: conifer
Hosts: *Juniperus* spp.

Megastigmus juniperi attacks the seeds of juniper.

***Megastigmus validus* Nikol'skaya, 1966**

Other scientific names:
Hymenoptera: Torymidae
Common names:
Host type: conifer
Hosts: *Juniperus* spp.

Megastigmus validus, a pest which attacks the seeds of junipers, is widespread in the regions of the Kyrgyz Republic where junipers grow. The Forestry Department in Osh has had problems with seed pests and has lost many valuable trees such as juniper. *M. validus* has damaged up to 50 percent of the seed yields. At the moment, no control measures have been used against this insect in the Kyrgyz Republic.

***Melanophila cuspidata* Klug**

Other scientific names:
Coleoptera: Buprestidae
Common names:
Host type: broadleaf
Hosts: *Pistacia* spp.

***Panaphis juglandis* (Goeze, 1778)**

Other scientific names: *Callaphis juglandis*
Homoptera: Drepanosiphidae
Common names: dusky-veined walnut aphid
Host type: broadleaf
Hosts: *Juglans* spp.; *J. cinerea*

Panaphis juglandis was originally described from Germany and is common in Central Asia and throughout Europe from Spain, Italy and Serbia to Denmark, Sweden and Poland. It has been introduced into the USA (Juronis and Rakauskas, 2004). Hosts include *Juglans regia*, *J. cinerea* in the Kyrgyz Republic, *J. fallax* in Uzbekistan, and *J. mandshurica* in the Slovak Republic (Juronis and Rakauskas, 2004).
http://www.ekoi.lt/uploads/docs/JuronisAZL%2014_67-70.pdf

***Phloeosinus turkestanicus* Sem.**

Other scientific names:
Coleoptera: Scolytidae
Common names:
Hosts type: conifer
Hosts: *Juniperus* spp.

Phloeosinus turkestanicus is one of the most dangerous pests in juniper forests. This insect is widespread in the Central Asian republics where junipers are grown. It primarily attacks weak juniper trees. Tree death may occur, particularly if the density level of the pest is 20-25 individuals per tree.

***Prionus turkestanicus* Semenov, 1888**

Other scientific names:
Coleoptera: Cerambycidae
Common names:
Host type: broadleaf
Hosts: *Prunus* spp.; *Juglans* spp.

***Recurvaria pistaciicola* (Danilewski)**

Other scientific names: *Schneidereria pistaciicola*
Lepidoptera: Gelechiidae
Common names: pistachio nut worm; pistachio fruit moth
Host type: broadleaf
Hosts: *Pistacia vera*

Recurvaria pistaciicola is a very serious insect pest in countries where pistachio is grown. In the Kyrgyz Republic, this insect has damaged approximately 2 000 ha of pistachio forests at elevations from 600-1600m (Romanenko, 1984; Toktoraliev, 1993; State Forest Service, 2004). Currently there are no monitoring or control efforts being used against *Recurvaria pistaciicola* in the pistachio forests of southern Kyrgyzstan.

***Rhopalopus nadari* Pic.**

Other scientific names:
Coleoptera: Buprestidae
Common names:
Host type: broadleaf
Hosts: *Prunus* spp.

***Scolytus mali* (Bechstein)**

Other scientific names:
Coleoptera: Scolytidae
Common names: larger shothole borer
Host type: broadleaf
Hosts: *Prunus* spp.; *Malus* spp.

http://www.barkbeetles.org/browse/subject.cfm?SUB=7795
http://www.padil.gov.au/viewPestDiagnosticImages.aspx?id=466

Xyleborus saxeni

Other scientific names:
Coleoptera: Scolytidae
Common names:
Host type: broadleaf
Hosts: *Prunus* spp.: *Juglans* spp.

***Xylotrechus namanganensis* Heyden**

Other scientific names:
Coleoptera: Buprestidae
Common names: Namangan longhorn beetle; willow longhorn beetle
Host type: broadleaf
Hosts: *Juglans* spp.

X. namanganensis is an important pest of forest, ornamental and deciduous fruit trees in the mountains of Central Asia, especially of *Populus* and *Salix* spp. in riparian

woodlands, *Elaeagnus* spp. in shelterbelts, fruit trees in valleys and ornamental and introduced plants in city plantings. It attacks numerous woody species, including trees planted in city streets and parks (*Celtis australis*, *Elaeagnus angustifolia*, *Platanus* × *hispanica*, *Populus alba*, *Populus nigra*, *Ulmus minor*, *Ulmus pumila*), trees in valley woodlands (*Alnus glutinosa*, *Populus diversifolia*, other *Populus* spp., *Salix alba*, other *Salix* spp.), and various fruit and nut trees (*Juglans regia*, *Malus domestica*, *Morus nigra*, *Prunus armeniaca*, *Prunus avium*, *Prunus dulcis*). Various other genera are also recorded as hosts such as *Betula* and *Crataegus.*

X. namanganensis attacks both stressed and healthy trees of different ages as well as cut trees and wood with bark. When a single tree is attacked by a significant number of beetles, it may die within 1 or 2 years. The concentration of the pest is usually very high, 5–10 emergence holes per 10 dm^2 of the bark. This species prefers to attack mature trees and, even in cases when it does not kill them, infestation results in significant delays for sprouting, advanced leaf shedding, loss of vigour and of wood marketability (because of dense, large galleries made by the larger larvae deep in the wood). The pest is most frequent in the valleys but also occurs up to an altitude of 2600 m.

Adults are active fliers. Larvae hidden in the wood are difficult to detect and therefore they may easily be transported with untreated wood or wood packaging.
http://www.eppo.org/QUARANTINE/insects/Xylotrechus_namanganensis/DSXYLONM.pdf#search=%22Xylotrechus%20namanganensis%20%22

***Yponomeuta malinellus* Zeller, 1838**

Other scientific names:
Lepidoptera: Yponomeutoidae
Common names: apple ermine moth
Host type: broadleaf
Hosts: *Malus* spp.; *Crataegus* spp.; *Prunus* spp.

***Yponomeuta padellus* (Linnaeus, 1758)**

Other scientific names:
Lepidoptera: Yponomeutoidae
Common names: cherry ermine moth; orchard ermine moth; plum small ermine moth
Host type: broadleaf
Hosts: *Malus* spp.; *Crataegus* spp.; *Prunus* spp.

Yponomeuta malinellus and *Y. padellus* are apple orchard pests in the forests of southern Kyrgyzstan. From 1965-1970, they damaged approximately 30 000-40 000 ha of apple orchards (Karavaeva and Romanenko, 1962; Karavaeva, 1967). Suppression of apple moth in the apple orchards was accomplished through the use of natural enemies such as *Ageniaspis fuscicoleles* Dalm. Recent outbreak areas covered 200-500 ha (State Forest Service, 2004).

Yponomeuta malinellus and *Y. padellus* are very similar in biology, morphology and the damage they cause to forests. Ermine moth nests can often be confused with those of the fall webworm and tent caterpillars. Fall webworm nests are much larger and occur much later in the summer; tent caterpillars build silken pads on trunks and major limbs. Ermine

moth nests consist of loosely gathered leaves that can extend the length of branches; however, the webbing is not as dense or thick as that of the fall webworm.
http://www.agf.gov.bc.ca/cropprot/fieldguide/applemoth.htm
http://www.forestryimages.org/browse/subimages.cfm?sub=9045
http://www.inra.fr/internet/Produits/HYPPZ/RAVAGEUR/6ypomal.htm
http://www.inspection.gc.ca/english/plaveg/pestrava/ypomal/ypomale.shtml
http://ukmoths.org.uk/show.php?bf=425
http://ukmoths.org.uk/show.php?bf=426
http://ceris.purdue.edu/napis/pests/aem/index.html
http://www.mda.state.mn.us/IPM/applefg/aem.pdf#search=%22Yponomeuta%20malinellus%20%22
http://www2.nrm.se/en/svenska_fjarilar/y/yponomeuta_padella.html

Introduced insects

The most serious introduced pests of the walnut-fruit forests include *Diaspidiotus perniciosus*, *Pseudococcus comstocki* and *Sphaerolecanium prunastri*. These species were introduced into the Republic with planted trees from Uzbekistan.

***Aeolesthes sarta* Solsky**

Other scientific names:
Coleoptera: Cerambycidae
Common names: city longhorn beetle; town longhorn beetle; Uzbek longhorn beetle; Sart longhorn beetle
Host type: broadleaf
Hosts: *Populus* spp., *Salix* spp., *Malus* spp.; *Juglans* spp.

Aeolesthes sarta is found in mountains up to an altitude of 2000 m. The area of origin of the pest is thought to be Pakistan and Western India, from which it spread westwards to Afghanistan and Iran and northwards to the Central Asian countries of the former USSR where it was first found in 1911 in Uzbekistan. The pest continues to increase its range in these countries.

A. sarta is one of the most important pests of many forest, ornamental and deciduous fruit trees in the region of its present distribution. It attacks both stressed and healthy trees of different ages. Successive generations remain on the same tree for several consecutive years, eventually causing its death. Sometimes, young larvae encircle a tree feeding on the cambium which leads to the rapid death of the tree. Young trees with thin bark are most susceptible to the beetle and 1-3 larvae may be enough to kill a tree.

In the Kyrgyz Republic, this species infests *Populus* spp., *Salix* spp. and *Malus* spp. in planted forests. *Juglans* spp. are preferred hosts in naturally regenerating forests. In general, it may damage species of *Acer*, *Betula*, *Elaeagnus, Fraxinus*, *Gleditsia*, *Juglans*, *Malus*, *Morus*, *Platanus*, *Populus*, *Prunus*, *Pyrus*, *Quercus*, *Robinia*, *Salix*, *Ulmus*, and other hardwood and fruit trees.

Natural spread of the pest by adult flight is relatively slow. Different life stages may readily be transported with untreated wood moving in trade, because they remain concealed and difficult to detect. Infested wood is the most likely pathway for

introduction. Since there is at present little international trade in the wood of host plants of *A. sarta*, the main phytosanitary risk comes from untreated wood packaging and dunnage. This pest is unlikely to be carried in plants for planting (of forest, ornamental or fruit trees) as it does not attack small branches, trunks or rootstocks. Adults may, however, be carried as contaminating pests on various commodities.
http://www.eppo.org/QUARANTINE/insects/Aeolesthes_sarta/DSAELSSA.pdf#search=%22Aeolesthes%20sarta%20%22
http://spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=2&langdisplay=english
http://www.invasive.org/browse/subimages.cfm?sub=4013
http://www.uochb.cas.cz/~natur/cerambyx/aeolsarta.htm

***Pseudococcus comstocki* (Kuwana)**

Other scientific names:
Homoptera: Pseudococcidae
Common names: Comstock mealybug
Host type: broadleaf
Hosts: *Prunus* spp.

Pseudococcus comstocki attacks various fruit hosts include pear, apple, and peach; it is also a pest of several ornamental plants such as catalpa, mulberry, pine and others. Mealybugs extract plant sap, reduce tree vigour and excrete honeydew. If a number of mealybugs feed on a stem, fruit drop can occur. Damage is most severe in spring and fall.
http://www.insectimages.org/browse/subimages.cfm?SUB=8393
http://www.nysipm.cornell.edu/factsheets/treefruit/pests/cmb/cmb.asp

***Quadraspidiotus perniciosus* (Comstock)**

Other scientific names: *Aspidiotus perniciosus* Comstock; *Comstockaspis perniciosa* (Comstock); *Diaspidiotus perniciosus* (Comstock)
Homoptera: Diaspididae
Common names: San José scale; California scale
Host type: broadleaf
Hosts: *Prunus* spp.

Quadraspidiotus perniciosus has a wide host range, attacking over 150 species, however it primarily attacks apples, peaches, pears, plums and *Rubus* spp. It also attacks many deciduous trees and shrubs including species of *Acacia*, *Acer*, *Amelanchier*, *Chaenomeles*, *Cotoneaster*, *Crataegus*, *Cydonia*, *Euonymus*, *Fagus*, *Juglans*, *Ligustrum*, *Maclura*, *Malus*, *Populus*, *Prunus*, *Ptelea*, *Pyrus*, *Ribes*, *Rosa*, *Salix*, *Sorbus*, *Symphoricarpos*, *Syringa*, *Tilia* and *Ulmus*. In the Far East, where the scale is indigenous, it infests *Betula* species and wild fruits.

All surface parts of young host plant tissue are infested. Attacks are generally on wood but, in severe infestations, leaves and fruits may also be penetrated. Bark often cracks and exudes gum, resulting in a surrounding dark-brown gelatinous area. Heavy infestation causes cessation of growth and loss of yield.

Q. perniciosus is indigenous to Eastern Asia and has spread to most parts of the world.

http://www.eppo.org/QUARANTINE/insects/Quadraspidiotus_perniciosus/QUADPE_ds.pdf#search=%22Diaspidiotus%20perniciosus%20%22

***Sphaerolecanium prunastri* (Boyer de Fonscolombe)**

Other scientific names:
Homoptera: Coccidae
Common names: globose scale; plum scale
Host type: broadleaf
Hosts: *Prunus* spp.

The globose scale, *Sphaerolecanium prunastri*, is a common and harmful soft scale species which attacks *Prunus* spp. and other stone fruit trees throughout the Holarctic region.
http://www.forestpests.org/subject.html?sub=8298

Diseases

Indigenous diseases

One of the most important diseases affecting the walnut-fruit forests is the destructive and widespread *Inonotus hispidus* (Prutenskaya, 1965; Prutenskaya, 1968; State Forest Service, 2004; Karashova, 2005). Juniper trees are susceptible to many fungal diseases. The most widespread species are *Pyrofomes demidoffii* and *Gymnosporangium* spp.

***Biscogniauxia mediterranea* var. *mediterranea* (De Not.) Kuntze**

Other scientific names: *Biscogniauxia mediterranea* (De Not.) Kuntze; *Diatrype clypeus* (Schwein.) Berk.; *Hypoxylon clypeus* (Schwein.) M.A. Curtis; *Hypoxylon mediterraneum* (De Not.) Ces. & De Not.; *Hypoxylon regium* De Not.; *Hypoxylon repandoides* Fuckel; *Hypoxylon sertatum* (Durieu & Mont.) Mont.; *Hypoxylon stigmateum* Cooke; *Nummularia clypeus* (Schwein.) Cooke; *Nummularia mediterranea* (De Not.) Sacc.; *Nummularia regia* (De Not.) Sacc.; *Nummularia regia* var. *mediterranea* (De Not.) Traverso; *Nummularia repandoides* (Fuckel) Sacc.; *Nummularia sertata* (Durieu & Mont.) Cooke; *Numulariola mediterranea* (De Not.) P.M.D. Martin; *Sphaeria clypeus* Schwein.; *Sphaeria mediterranea* De Not.; *Sphaeria mediterranea* Ettingsh.; *Sphaeria sertata* Durieu & Mont.; *Sphaerites mediterraneus* (Ettingsh.) Mesch.
Ascomycota: Xylariaceae
Common names:
Host type: broadleaf
Hosts: *Pistacia vera*

Biscogniauxia mediterranea var. *mediterranea* has damaged up to 80 percent of the trees in the walnut-fruit forests. The impacts on the trees have included mechanical damage and susceptibility to sunlight (burn/scorch).

***Fomes fomentarius* (L.) J.J. Kickx**

Other scientific names: *Agaricus fomentarius* (L.) Lam.; *Boletus fomentarius* L.; *Elfvingia fomentaria* (L.) Murrill; *Elfvingiella fomentaria* (L.) Murrill; *Ochroporus*

fomentarius (L.) J. Schröt.; *Placodes fomentarius* (L.) Quél.; *Polyporus fomentarius* (L.) Fr.; *Pyropolyporus fomentarius* (L.) Teng; *Scindalma fomentarium* (L.) Kuntze; *Ungulina fomentaria* (L.) Pat.
Basidiomycota: Polyporaceae
Common names: white spongy trunk rot; tinder fungus; hoof fungus; tinder polypore
Host type: broadleaf
Hosts: *Pistacia vera*

Fomes fomentarius causes decay in both living and dead timber, producing a white rot that is present in both sapwood and heartwood. If fruiting bodies are visible, there is little marketable heartwood in a tree.
http://www.pfc.forestry.ca/diseases/CTD/Group/Heart/heart3_e.html
http://www.uoguelph.ca/~gbarron/MISC2003/fomentar.htm

***Ganoderma applanatum* (Pers.) Pat.**

Other scientific names: *Agaricus lipsiensis* (Batsch) E.H.L. Krause; *Boletus applanatus* Pers.; *Boletus lipsiensis* Batsch; *Elfvingia applanata* (Pers.) P. Karst; *Elfvingia megaloma* (Lév.) Murrill; *Fomes applanatus* (Pers.) Gillet; *Fomes applanatus f. leucophaeus* (Mont.) Lloyd; *Fomes applanatus var. leucophaeus* (Mont.) Cleland & Cheel; *Fomes gelsicola* Berl.; *Fomes incrassatus* (Berk.) Cooke; *Fomes leucophaeus* (Mont.) Cooke; *Fomes longoporus* Lloyd; *Fomes megaloma* (Lév.) Cooke; *Fomes stevenii* (Lév.) P. Karst.; *Friesia applanata* (Pers.) Lázaro Ibiza; *Ganoderma flabelliforme* Murrill; *Ganoderma gelsicola* (Berl.) Sacc.; *Ganoderma incrassatum* (Berk.) Bres.; *Ganoderma leucophaeum* (Mont.) Pat.; *Ganoderma lipsiense* (Batsch) G.F. Atk.; *Ganoderma lipsiense*; *Ganoderma megaloma* (Lév.) Bres.; *Phaeoporus applanatus* (Pers.) J. Schröt.; *Placodes applanatus* (Pers.) Quél.; *Polyporus applanatus* (Pers.) Wallr.; *Polyporus concentricus* Cooke; *Polyporus incrassatus* Berk.; *Polyporus leucophaeus* Mont.; *Polyporus lipsiensis* (Batsch) E.H.L. Krause; *Polyporus megaloma* Lév.; *Polyporus merismoides* Corda; *Polyporus stevenii* Lév.; *Polyporus subganodermicus* (Lázaro Ibiza) Sacc. & Trotter; *Scindalma gelsicola* (Berl.) Kuntze; *Scindalma incrassatum* (Berk.) Kuntze; *Scindalma leucophaeum* (Mont.) Kuntze; *Scindalma lipsiense* (Batsch) Kuntze; *Scindalma megaloma* (Lév.) Kuntze; *Scindalma stevenii* (Lév.) Kuntze; *Ungularia subganodermica* Lázaro Ibiza
Basidiomycota: Ganodermataceae
Common names: white mottled rot; Ganoderma butt rot
Host type: broadleaf
Hosts: *Pistacia vera*

Ganoderma applanatum is an important decomposer of logs and stumps but may enter living trees through wounds and can cause decay of sapwood and heartwood in roots, butts and trunks of trees. Infected trees exhibit slower growth rates and the leaves are often small and yellowed. Wood which is infected by the mycelium of the fungus has a light coloured, mottled appearance. In advanced stages of decay the wood readily fractures across the grain. It remains firm for a time but eventually becomes soft and spongy. Columns of decaying wood often extend above and below the brackets.

Ganoderma applanatum is commonly recorded on deciduous trees, but is also found on a wide range of coniferous tree species.

http://www.pfc.forestry.ca/diseases/CTD/Group/Heart/heart6_e.html
http://www.rbgsyd.nsw.gov.au/information_about_plants/pests_diseases/fact_sheets/ganoderma_butt_rot

***Gymnosporangium* spp.**

Other scientific names:
Basidiomycota: Pucciniaceae
Common names:
Host type: conifer
Hosts: *Juniperus* spp.

http://www.forestryimages.org/browse/genus.cfm?id=Gymnosporangium

***Inonotus hispidus* (Bull.) P. Karst.**

Other scientific names: *Polyporus hispidus* (Bull.) Fr.; *Boletus hispidus* Bull.; *Inonotus hirsutus* (Scop.) Murrill; *Phaeoporus hispidus* (Bull.) J. Schröt; *Polyporus endocrocinus* Berk.; *Boletus spongiosus* Lightf.; *Boletus velutinus* Sowerby; *Boletus villosus* Huds.; *Hemidiscia hispida* (Bull.) Lázaro Ibiza; *Inodermus hispidus* (Bull.) Quél.; *Polystictus hispidus* (Bull.) Gillot & Lucand; *Xanthochrous hispidus* (Bull.) Pat.
Basidiomycota: Hymenochaetaceae
Common names: hispidus canker; ash heart rot; walnut heart rot; shaggy bracket
Host type: broadleaf
Hosts: *Juglans regia*; *Pistacia vera*

Inonotus hispidus causes cankers in trees which are large, elongate, sunken in the center and bordered by callus folds. Infected stems become spindle-shaped. A small branch stub may be found near the center of the canker where the infection started. *Inonotus hispidus* is widespread in the walnut-fruit forests of the Kyrgyz Republic and has damaged up to 60 percent of the trees. This species has been reported to infest pistachio trees in naturally regenerating forests and maples in planted forests.
http://www.forestpests.org/subject.html?SUB=886
http://www.fs.fed.us/r8/foresthealth/pubs/oakpests/p40.html
http://www.cabicompendium.org/NamesLists/FC/Full/INONHI.htm

***Laetiporus sulphureus* (Bull.) Murrill**

Other scientific names: *Agarico-carnis flammula* Paulet; *Agarico-pulpa styptica* Paulet; *Agaricus speciosus* Battarra; *Boletus citrinus* Lumn.; *Boletus coriaceus* Huds.; *Boletus imbricatus* Bull.; *Boletus lingua-cervina* Schrank; *Boletus ramosus* Bull.; *Boletus sulphureus* Mérat; *Boletus sulphureus* Bull.; *Boletus tenax* Bolton; *Boletus tenax* Lightf.; *Ceriomyces aurantiacus* (Pat.) Sacc.; *Ceriomyces neumanii* Bres.; *Cladomeris casearius* (Fr.) Quél.; *Cladomeris imbricatus* (Bull.) Quél.; *Cladoporus sulphureus* (Bull.) Teixeira; *Daedalea imbricata* (Bull.) Purton; *Grifola sulphurea* (Bull.) Pilát; *Laetiporus cincinnatus* (Morgan) Burds., Banik & T.J. Volk; *Laetiporus speciosus* Battarra ex Murrill; *Laetiporus sulphureus f. aurantiacus* (Pat.) Bondartsev; *Laetiporus sulphureus f. ramosus* (Quél.) Bondartsev; *Leptoporus casearius* (Fr.) Quél.; *Leptoporus imbricatus* (Bull.) Quél.; *Leptoporus ramosus* (Bull.) Quél.; *Leptoporus sulphureus* (Bull.) Quél.;

Merisma imbricatum (Bull.) Gillet; *Merisma sulphureus* (Bull.) Gillet; *Polypilus casearius* (Fr.) P. Karst.; *Polypilus imbricatus* (Bull.) P. Karst.; *Polypilus sulphureus* (Bull.) P. Karst.; *Polyporellus rubricus* (Berk.) P. Karst.; *Polyporus candicinus* (Scop.) J. Schröt.; *Polyporus casearius* Fr.; *Polyporus cincinnatus* Morgan; *Polyporus imbricatus* (Bull.) Fr.; *Polyporus ramosus* (Bull.) Gray; *Polyporus rostafinskii* Błoński; *Polyporus rubricus* Berk.; *Polyporus sulphureus* (Bull.) Fr.; *Polyporus todari* Inzenga; *Ptychogaster aurantiacus* Pat.; *Ptychogaster aureus* Lloyd; *Sistotrema sulphureum* (Bull.) Rebent.; *Stereum speciosum* Fr.; *Sulphurina sulphurea* (Quél.) Pilát; *Tyromyces sulphureus* (Bull.) Donk
Basidiomycota: Polyporaceae
Common names: brown cubical rot; chicken mushroom; sulphur fungus rot; sulphureus brown cubical rot
Host type: broadleaf
Hosts: *Pistacia vera*

Laetiporus sulphureus is a pathogenic and saprophytic fungus that causes a brown cubicle rot of roots, butts, and heartwood of living trees. Fruiting bodies are often not formed until years after the fungus is well established, so when present, they indicate significant internal defect of host trees. The rot is generally restricted to the butt log. Decay caused by the fungus ruins the best parts of trunks of older trees and therefore impacts the wood and wood products industry. *L. sulphureus* affects a wide range of coniferous and deciduous hosts in the Kyrgyz Republic, it is particularly associated with pistachio trees in naturally regenerating forests and poplar and willow planted forests.
http://www.forestryimages.org/browse/subthumb.cfm?sub=535
http://www.forestpests.org/ash/sulfurfungus.html
http://www.pfc.forestry.ca/diseases/ctd/Group/Heart/heart8_e.html
http://www.cfl.scf.rncan.gc.ca/imfoc-idwcf/fichemaladie_e.asp?id=1000014

***Pyrofomes demidoffii* (Lév.) Kotl. & Pouzar 1964**

Other scientific names: *Fomes demidoffii* (Lév.) Cooke; *Fomes earlei* (Murrill) Sacc. & D. Sacc.; *Fomes juniperinus* (H. Schrenk) Sacc. & P. Syd.; *Fulvifomes demidoffii* (Lév.) Murrill; *Inonotus demidoffii* (Lév.) Pilát; *Phellinus demidoffii* (Lév.) Bondartsev & Singer; *Polyporus demidoffii* Lév.; *Polyporus juniperinus* H. Schrenk; *Pyropolyporus earlei* Murrill; *Pyropolyporus juniperinus* (H. Schrenk) Murrill; *Scindalma demidoffii* (Lév.) Kuntze; Trametes demidoffii (Lév.) P. Karst.; *Xanthochrous demidoffii* (Lév.) Pat.
Basidiomycota: Polyporaceae
Common names: juniper pocket rot; white trunk rot
Host type: conifer
Hosts: *Juniperus* spp.

Pyrofomes demidoffii is a white trunk rot that attacks living trees and can cause significant losses. In the Kyrgyz Republic, it has been recorded on juniper trees.
http://www.indexfungorum.org/Names/SynSpecies.asp?RecordID=338105

Introduced diseases

No records were available for introduced diseases affecting the naturally regenerating forests of the Kyrgyz Republic.

Other pests

Indigenous other pests

Aceria erinoea Nal.

Other scientific names: *Eriophyes erineus* Nal.
Acarina: Eriophyoidae
Common names: walnut leaf gall mite
Host type: broadleaf
Hosts: *Juglans* spp.

Aceria tristriatus Nal.

Other scientific names: *Eriophyes tristriatus*
Acarina: Eriophyoidae
Common names:
Host type: broadleaf
Hosts: *Juglans* spp.

Arceuthobium oxycedri (DC.) M. Bieb.

Other scientific names:
Santalales: Viscaceae
Common names: juniper dwarf mistletoe; American mistletoe; juniper mistletoe
Host type: conifer
Hosts: *Juniperus* spp.

Dwarf mistletoes, *Arceuthobium* spp., are parasitic plants that infect many conifers of the families Pinaceae and Cupressaceae. They cause growth loss, deformity and, in extreme cases, tree mortality. Most dwarf mistletoes are found in North America but several species occur in Central America, the Caribbean, the Mediterranean region of Europe and Northern Africa, eastern Africa, the Near East and Asia. *Arceuthobium oxycedri* infects a number of species of *Juniperus* across its natural range from the Mediterranean region of Europe and North Africa, to the Near East and Asia.
http://www.forestryimages.org/browse/subimages.cfm?sub=7074
http://www.cabicompendium.org/NamesLists/FC/Full/ARE_OX.htm

Eriophyes mali Nal.

Other scientific names:
Acarina: Eriophyoidae
Common names: apple leaf blister galls; apple blister mite
Host type: broadleaf
Hosts: *Malus* spp.

http://www.insectimages.org/browse/subimages.cfm?SUB=10562

Eriophyes phloeocoptes Nal.

Other scientific names:

Acarina: Eriophyoidae
Common names: plum tree bud mite; plum spur mite
Host type: broadleaf
Hosts: *Prunus* spp.

Eriophyes phloeocoptes attacks *Prunus* species in the Kyrgyz Republic. The feeding by nymphs causes the formation of small spherical, smooth galls, the walls of which thicken. When flowering shoots are attacked, their growth is interrupted and flowers develop imperfectly.
http://www.inra.fr/hyppz/RAVAGEUR/6acaphl.htm

***Eriophyes pyri* Nal.**

Other scientific names:
Acarina: Eriophyoidae
Common names: pear leaf blister mite
Host type: broadleaf
Hosts: *Pyrus* spp.

Eriophyes pyri attacks pear and sometimes apple trees. Feeding results in the formation of small projecting galls on both sides of the leaf. The attacked tissues canker and in serious cases, the leaf dries up and drops. The floral parts are sometimes attacked which results in the fruits become deformed and drop prematurely.
http://www.ento.csiro.au/aicn/system/c_86.htm
http://www.inra.fr/hyppz/RAVAGEUR/6phypyr.htm
http://www.ento.vt.edu/Fruitfiles/pearblister.html

***Eriophyes tarbinskii* Pon.**

Other scientific names:
Acarina: Eriophyoidae
Common names:
Host type: broadleaf
Hosts: *Juglans* spp.

***Trisetacus kirghisorum* Shevchenko**

Other scientific names:
Acarina: Eriophyoidae
Common names: Kyrgyz juniper mite
Host type: conifer
Hosts: *Juniperus semiglobosa*

Trisetacus kirghisorum attacks the fruits of *Juniperus semiglobosa* and destroys the seeds. This mite is reported from Central Asia including Kyrgyzstan, Tajikistan and Uzbekistan and it may also occur in Afghanistan, India and Pakistan. *Juniperus semiglobosa*, a species indigenous to Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan), western Asia (Afghanistan), the western Himalaya region of India and China (Tibet), is the only known host of this mite. In some years up to 90 percent of juniper seed crops have been destroyed in Kyrgyzstan and Uzbekistan, resulting in

reproductive failure. Studies over a 40-year period in Kyrgyzstan by V. G. Shevchenko show significant annual fluctuations in the level of damage caused by this mite.

Many species of *Juniperus* grow in areas where the climate is arid or semi-arid. Even during years of abundant seed crops and absence of seed pests, natural regeneration can be sparse because of dry conditions. In the natural range of *Trisetacus kirghisorum*, junipers are important sources of fuelwood, fence posts and other products. Loss of seed crops will further reduce natural regeneration of junipers, thus accelerating rates of deforestation in areas where the sustainability of juniper forests is already threatened by heavy human use.

In Central Asia, pure juniper forests are the dominant forest cover in many areas. Junipers provide watershed protection and habitat and food for indigenous wildlife. Therefore, periodic failure of juniper seed crops due to heavy infestations of *Trisetatcus kirghisorum* will have an adverse effect on natural regeneration and, possibly, wildlife.
http://spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=75&langdisplay=english
http://www.invasive.org/browse/subimages.cfm?sub=4096

Introduced other pests

No records were available for introduced other pests (e.g. mites, nematodes, mammals, etc.) affecting the naturally regenerating forests of the Kyrgyz Republic.

Diebacks and other conditions

No records were available for diebacks and other conditions affecting the naturally regenerating forests of the Kyrgyz Republic.

Planted forests

Detailed information on the planted forests of the Kyrgyz Republic can be found in Annex 1.

Insects

Indigenous insects

The most widespread species in spruce forests are *Ips hauseri*, *Pityogenes spessivtsevi, Hylastes subtriatus* and *Tetropium staudingeri*. Pine plantations are mainly damaged by *Pineus pini*, particularly in stressed trees and where pine trees (*Pinus silvestris*) have been introduced.

Adelges japonicus Monzen

Other scientific names:
Hemiptera: Adelgidae
Common names: spruce gall aphid
Host type: conifer
Hosts: *Pinus* spp.

***Agonoscena viridis* Bajeva.**

Other scientific names:
Homoptera: Aphalaridae
Common names:
Host type: broadleaf
Hosts: *Malus* spp.; *Crataegus* spp.

***Anthaxia bicolor* Faldermann**

Other scientific names:
Coleoptera: Buprestidae
Common names:
Host type: conifer
Hosts: *Pinus* spp.

***Anthaxia turkestanica* Obenberger, 1912**

Other scientific names:
Coleoptera: Buprestidae
Common names:
Host type: conifer
Hosts: *Pinus* spp.

***Caliroa cerasi* Linnaeus, 1758**

Other scientific names: *Caliroa limacina*
Hymenoptera: Tenthredinidae
Common names: pear slug; cherry slug; pear slugworm; cherry slugworm; cherry sawfly; pear sawfly; black-and-yellow sawfly
Host type: broadleaf
Hosts: *Crataegus* spp.; *Prunus* spp.

Damage from pear slugs occurs most often in the upper leaves of the trees and migrates downward. The larvae feed on the upper surface of leaves removing the green epidermis, skeletonizing them, and leaving only a network of veins. Pear slug damage occurs in two peaks during the year, coinciding with the presence of full-grown larvae. Though the damage can be unattractive, pear slugs generally cause little economic losses. However, on occasions infestations become so great that susceptible plants can be completely defoliated. Such extreme defoliation results in poor quality and low yields of fruit and can quickly weaken and kill newly planted trees.

The preferred hosts of *Caliroa cerasi* are pear and cherry although it also attacks plum, hawthorn, buttonbrush and mountain ash.
http://www.ento.csiro.au/aicn/name_s/b_765.htm
http://www.agf.gov.bc.ca/cropprot/tfipm/pearslug.htm
http://ag.arizona.edu/urbanipm/insects/pearslugs.html
http://www.cabicompendium.org/NamesLists/FC/Full/ERICLI.htm
http://cru.cahe.wsu.edu/CEPublications/eb1369/eb1369.html

***Cinara grossa* (Kaltenbach, 1846)**

Other scientific names:
Hemiptera: Lachnidae
Common names:
Host type: conifer
Hosts: *Picea* spp.

***Hylastes substriatus* Strohm.**

Other scientific names:
Coleoptera: Curculionidae
Common names:
Host type: conifer
Hosts: *Picea* spp.

***Ips hauseri* Reitter**

Other scientific names:
Coleoptera: Scolytidae
Common names: Kyrgyz mountain engraver; Hauser's engraver; Mountain Kyrgyz bark beetle; Mountain Kyrgyz engraver; Mountain Kyrgyz ips
Host type: conifer
Hosts: *Picea schrenkiana*; *Pinus sylvestris*; *Pinus pallasiana*; *Larix sibirica*

Ips hauseri attacks certain species of *Picea*, *Pinus* and *Larix.* In the Kyrgyz Republic, this species was considered as a monophagous pest of *Picea schrenkiana* but, after the introduction in 1930/1932 of *Pinus sylvestris*, *Pinus pallasiana* and *Larix sibirica* into this area, it became a serious pest of these trees, especially of *P. sylvestris*. In addition, *I. hauseri* often kills plantation trees of *P. sylvestris* in the Kyrgyz Republic and Kazakhstan.

The pest may attack slightly stressed and apparently healthy trees of different ages but it prefers to attack mature trees and the infestation results in significant loss of vigour and decrease of wood and seed production, reduction in wood marketability or even death of the trees. *I. hauseri* is usually the first to attack almost healthy or slightly stressed trees and then is often followed by outbreaks of other wood-borers, particularly the cerambycids *Tetropium staudingeri*, *Dokhtouroffia nebulosa* and *Dokhtouroffia baeckmanni*, the scolytids *Pityophthorus kirgisicus*, *Ips spessivtsevi*, and other pests. The pest mainly occurs in mountain forests, which are very important for soil protection against erosion and it often causes the death of forests. They develop very fast and populations may build-up rapidly thereby increasing the rate of injury. *I. hauseri* is particularly dangerous in years of drought.

Natural spread of the pest by adult flight is limited. All life stages of *I. hauseri* may be easily transported with untreated coniferous (mainly spruce, pine and larch) wood commodities carrying bark, and possibly on cut branches (including Christmas trees). It would be unlikely to be transported in plants for planting since any infested material would certainly show symptoms and would be rejected for sale.

http://www.eppo.org/QUARANTINE/insects/Ips_hauseri/DSIPSXHA.pdf#search=%22Ips%20hauseri%20%22
http://www.invasive.org/browse/subimages.cfm?sub=10982
http://spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=130&langdisplay=english

***Labidostomis stenostoma* Wse.**

Other scientific names:
Coleoptera: Chrysomelidae
Common names:
Host type: broadleaf
Hosts: *Malus* spp.; *Crataegus* spp.

***Lymantria dispar* Linnaeus, 1758**

Other scientific names: *Bombyx dispar*; *Hypogymna dispar*; *Liparis dispar*; *Ocneria dispar*; *Phalaena dispar*; *Porthesia dispar*; *Porthetria dispar*; *Porthetria hadina* Butler, 1881; *Porthetria umbrosa* Butler, 1881
Lepidoptera: Lymantriidae
Common names: Asian gypsy moth; gypsy moth
Host type: broadleaf
Hosts: *Juglans* spp.; *Malus* spp.; *Crataegus* spp.

The gypsy moth is one of the most important forest insect pest species in Central Asia. In naturally regenerating forests of the Kyrgyz Republic, this species attacks pistachio, walnut, apple and hawtorn trees and in planted forests it is known to infest walnut, apple and hawtorn trees.

This species of moth can occur at low levels in forests for many years without causing significant damage. However, at times there are significant outbreaks that cause severe defoliation of trees, which can cause tree mortality. 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 the following spring for the next generation of larvae. High levels of parasitism can also cause outbreaks to collapse.

Adults of Asian strains are capable of flight, hence dispersal over large areas is possible and the risk of introduction to new areas is increased. Females of European strains cannot fly. Young larvae can move some distance by ballooning from tops of trees. Human activities can also facilitate the movement of this pest. Some of the pathways include vehicles, camping equipment, nursery stock, ships, vehicles, and equipment that have been exposed for a period to the outdoors.
http://www.issg.org/database/species/ecology.asp?si=96&fr=1&sts=sss
http://www.inspection.gc.ca/english/sci/surv/data/lymdise.shtml
http://www.forestpests.org/subject.html?SUB=165
http://www.padil.gov.au/viewPest.aspx?id=342
http://www.padil.gov.au/viewPestDiagnosticImages.aspx?id=342
http://www.forestry.ubc.ca/fetch21/FRST308/lab5/lymantria_dispar/gypsy.html

***Malacosoma parallela* Staudinger**

Other scientific names:
Lepidoptera: Lasiocampidae
Common names: mountain ring silk moth; mountain tent caterpillar
Host type: broadleaf
Hosts: *Malus* spp.; *Crataegus* spp.; *Prunus* spp.

M. parallela is an important defoliator of many deciduous trees in many countries of the former USSR. It occurs in the Near East and Central Asia including northern Iran, eastern Kazakhstan, Kyrgyzstan, Uzbekistan, Syria, Tajikistan, Turkey and Turkmenistan. It has also been reported from Armenia, Russia, including the northern Caucasus, Dagestan, Chechnya and European Turkey.

M. parallela has a wide host range and feeds on many species of shrubs and woody plants, including many of importance in agriculture, arboriculture and forestry. Defoliation can result in growth loss, branch dieback, tree mortality and changes of species composition in favour of non-host species. Another effect of defoliation is reduced seed crops of host plants, which can affect natural regeneration. Moreover, many wildlife species dependent on seed and nut crops for food could be indirectly affected by outbreaks. Damage may be caused by this species alone, or in association with other defoliators such as *Yponomeuta padellus*, *Euproctis kargalica*, *Erschoviella musculana*, and *Lymantria dispar*. Attacks may result in serious changes in the environment over large areas, including problems of erosion.

Outbreaks often last for two consecutive years. It was particularly noted as a very dangerous pest of oak in the mountains of Armenia and of forests, fruit trees and shrubs of *Rosaceae*, *Fagaceae* and *Elaeagnaceae* in the mountains of Tajikistan. It attacks both stressed and healthy trees of different ages. Outbreaks occur throughout large mountain areas, often resulting in 100 percent defoliation and sometimes leading to the death of trees and forests. The main outbreaks of *M. parallela* occur in mountain forests at an altitude of 1000–1800m where the pest finds optimal conditions for its development. It can occur up to 2400m. *Malacosoma parallela* has one generation per year and overwinters in the egg stage.

Both males and female adults are capable of flight. Because this insect is a tent-making caterpillar and larvae feed gregariously, they are not highly subject to dispersal by air currents, nor are wind-dispersed larvae likely to survive even if they land on a suitable host plant. Opportunities for human assisted transport are judged to be limited because life stages and larval tents are conspicuous and easily detected on plant materials destined for export. Moreover, this insect is not likely to survive a long ocean journey as a hitchhiker except possibly in the egg stage.
http://www.eppo.org/QUARANTINE/insects/Malacosoma_parallela/DSMALAPA.pdf#search=%22Malacosoma%20parallela%22
http://www.spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=140&langdisplay=english
http://www.invasive.org/browse/subimages.cfm?sub=10983

***Melasoma populi* Linnaeus, 1758**

Other scientific names: *Chrysomela populi* Linnaeus, 1758
Coleoptera: Chrysomelidae
Common names: poplar leaf beetle
Host type: broadleaf
Hosts: *Populus* spp.

http://www.forestryimages.org/browse/subimages.cfm?SUB=10274
http://www.forestales.net/General/plagas/plaga12.htm (In Spanish)

***Molorchus kiesenwetteri* Mulsant & Rey, 1861**

Other scientific names:
Coleoptera: Cerambycidae
Common names:
Host type: conifer
Hosts: *Pinus* spp.

***Molorchus pallidipennis* Heyden, 1887**

Other scientific names:
Coleoptera: Cerambycidae
Common names:
Host type: broadleaf and conifer
Hosts: *Pinus* spp.; *Picea* spp.; *Juglans* spp.

http://www.zin.ru/animalia/Coleoptera/rus/molpaldk.htm

***Phloeosinus turkestanicus* Sem.**

Other scientific names:
Coleoptera: Scolytidae
Common names:
Hosts type: conifer
Hosts: *Juniperus* spp.; *Picea* spp.

Phloeosinus turkestanicus is widespread in the Central Asian Republics where junipers are grown. They primarily attack weakened or stressed trees. Tree death may occur particularly if the density level of the pest is 20-25 individuals per tree.

Pineus pini

Other scientific names: *Anisophleba pini* Koch, 1857; *Aphis pini* Gmelin, 1790*; Kermes pini* Macquart, 1819; *Kermaphis pini* var. *laevis* Maskell, 1885; *Pineus boerneri* Annand, 1928; *Pineus havrylenkoi* Blanchard, 1944; *Pineus laevis* (Maskell, 1885) Börner, 1907; *Pineus pini* (Macquart, 1819) Börner, 1907; *Pineus simmondsi* Yaseen & Ghani, 1971; *Pineus sylvestris* Annand, 1928
Hemiptera: Adelgidae
Common names: Eurasian pine adelgid; pine woolly aphid; red pine adelgid; common pine aphid; pine adelgid
Host type: conifer

Hosts: *Pinus* spp.

A pest of *Pinus* spp., the pine woolly aphid feeds on shoots at times causing tip dieback. It occurs in Africa, Australia, Europe, New Zealand and North and South America. Control of this pest by biological control is variable - in some areas this method has been highly successful and significantly less so in others. This aphid has been moved into new areas mostly by movement of infested planting stock.
http://www.insectimages.org/browse/subimages.cfm?SUB=8092
http://www.cabicompendium.org/NamesLists/FC/Full/PINEPI.htm
http://www.fzi.uni-freiburg.de/InsectPestKey-long%20version/pineus.htm
http://www.ento.csiro.au/aicn/name_s/b_3293.htm

***Pityogenes spessivtsevi* Lebedev**

Other scientific names: *Ips spessivtsevi* (Lebedev); *Pityogenes perfosus* Beeson
Coleoptera: Curculionidae
Common names: spiral bark beetle; Spessivtsev's engraver; spiral engraver; spiral-gallery engraver; spruce engraver
Host type: conifer
Hosts: *Picea* spp.

Pityogenes spessivtsevi is considered an important pest of *Picea* spp. in Central Asia, particularly *Picea schrenkiana*. This insect is found in three Central Asian countries: Kazakhstan, Kyrgyzstan and Tajikistan. It is also reported from China (Xinjiang Province), India (Uttar Pradesh, Kashmir), and Asian Russia.

It can attack slightly stressed and healthy trees of different ages and continues to breed in the same trees over several consecutive years, ultimately causing their death. Symptoms of infestation include the occurrence of host trees with all or a portion of the tree containing faded or yellow foliage. The bark surface will contain pitch tubes or reddish coloured boring dust and, if the beetles have emerged, small exit holes. Egg and larval galleries, characteristic of *Pityogenes* spp., are present in the cambium and inner bark of infested trees.

Infestations of this bark beetle are commonly associated with the engraver beetle, *Ips hauseri*, and *Pityophthorus kirgisicus*. Woodborers associated with these bark beetle attacks include *Tetropium staudingeri, Dokhtouroffia nebulosa* and *Dokhtouroffia baeckmanni*. The typical sequence of invasion is not clear, although many workers consider *Ips hauseri* to be the more aggressive bark beetle. However, *P. spessivtsevi* is more common than *Ips hauseri* in high elevation spruce forests.

Extensive tree mortality caused by bark beetles in high elevation forests with steep slopes could accelerate soil erosion and reduce water quality. Infestations and resultant tree mortality could also result in changes of tree species composition in naturally regenerating forests in favour of non-host species. Large numbers of bark beetle killed trees will increase fuel levels in forests and increase the severity and extent of wildfires.

Adults can fly short distances in search of suitable breeding sites and are also subject to wind dispersal. Immature stages and adults may be transported in unprocessed logs, wood products or wooden packing material, dunnage or pallets containing bark strips.

http://www.invasive.org/browse/subimages.cfm?sub=10988
http://spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=131&langdisplay=english

Pityophthorus parfentjevi

Other scientific names:
Coleoptera: Scolytidae
Common names:
Host type: conifer
Hosts: *Pinus* spp.

Pityophthorus schrenkianus

Other scientific names:
Coleoptera: Scolytidae
Common names:
Host type: conifer
Hosts: *Pinus* spp.

***Tetropium staudingeri* Pic**

Other scientific names: *Tetropium staudingeri* Plavilstshikov; *Tetropium tjanshanicum* Semenov
Coleoptera: Cerambycidae
Common names: seven-river spruce borer; Staudinger's spruce borer
Host type: broadleaf and conifer
Hosts: *Picea* spp.; *Juglans* spp.

Tetropium staudingeri is one of the most important and common pests of spruce, primarily *Picea schrenkiana*, within its natural range from northwestern China (Xinjiang Province) and central Asia, including Kazakhstan, Kyrgyzstan and Uzbekistan. It may attack slightly stressed and healthy trees of different ages and continues to attack the same trees over several consecutive years, eventually causing their death. This species prefers to attack mature trees and, even in cases where it does not kill them, the infestation results in significant loss of vigour and wood marketability due to larval boring. This insect occurs primarily in mountain forests, which are important for the protection of watersheds subject to soil erosion. It is one of the most common and damaging pests of spruce forests stressed by insect defoliators or damaged by diseases or forest fires. Outbreaks sometimes lead to the death of trees and forests, either by itself or in association with other insects.

T. staudingeri often attacks trees in association with *Dokhtouroffia baeckmanni* and the bark beetles *Ips hauseri* and *Pityogenes spessivtsevi*. If the level of infestation is high, it displaces bark beetles, which normally occupy the upper parts of the trunk, in competition for available food. In stumps, this insect often occurs in association with the longhorn beetle, *Asemum striatum*.

Adults are strong fliers and could travel several kilometers in search of suitable host trees. All life stages could be moved via unprocessed logs, lumber, wooden crating, pallets and dunnage.

http://www.invasive.org/browse/subimages.cfm?sub=10995
http://spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=145&langdisplay=english

Introduced insects

***Aeolesthes sarta* Solsky**
Other scientific names:
Coleoptera: Cerambycidae
Common names: city longhorn beetle; town longhorn beetle; Uzbek longhorn beetle; Sart longhorn beetle
Host type: broadleaf
Hosts: *Populus* spp., *Salix* spp., *Malus* spp.; *Juglans* spp.

A. sarta is found in mountains up to an altitude of 2000 m. The area of origin of the pest is thought to be Pakistan and Western India, from which it spread westwards to Afghanistan and Iran and northwards to the Central Asian countries of the former USSR where it was first found in 1911 in Uzbekistan. The pest continues to increase its range in these countries.

A. sarta is one of the most important pests of many forest, ornamental and deciduous fruit trees in the region of its present distribution. It attacks both stressed and healthy trees of different ages. Successive generations remain on the same tree for several consecutive years, eventually causing its death. Sometimes, young larvae encircle a tree feeding on the cambium which leads to the rapid death of the tree. Young trees with thin bark are most susceptible to the beetle and 1-3 larvae may be enough to kill a tree.

In the Kyrgyz Republic, this species infests *Populus* spp., *Salix* spp. and *Malus* spp. in planted forests. *Juglans* spp. are preferred hosts in naturally regenerating forests. In general, it may damage species of *Acer*, *Betula*, *Elaeagnus, Fraxinus*, *Gleditsia*, *Juglans*, *Malus*, *Morus*, *Platanus*, *Populus*, *Prunus*, *Pyrus*, *Quercus*, *Robinia*, *Salix*, *Ulmus*, and other hardwood and fruit trees.

Natural spread of the pest by adult flight is relatively slow. Different life stages may readily be transported with untreated wood moving in trade, because they remain concealed and difficult to detect. Infested wood is the most likely pathway for introduction. Since there is at present little international trade in the wood of host plants of *A. sarta*, the main phytosanitary risk comes from untreated wood packaging and dunnage. This pest is unlikely to be carried in plants for planting (of forest, ornamental or fruit trees) as it does not attack small branches, trunks or rootstocks. Adults may, however, be carried as contaminating pests on various commodities.
http://www.eppo.org/QUARANTINE/insects/Aeolesthes_sarta/DSAELSSA.pdf#search=%22Aeolesthes%20sarta%20%22
http://spfnic.fs.fed.us/exfor/data/pestreports.cfm?pestidval=2&langdisplay=english
http://www.invasive.org/browse/subimages.cfm?sub=4013
http://www.uochb.cas.cz/~natur/cerambyx/aeolsarta.htm

***Hyphantria cunea* Drury**
Other scientific names: *Hyphantria textor*

Lepidoptera: Arctiidae
Common names: fall webworm
Host type: broadleaf
Hosts: *Acer* spp.

Hyphantria cunea is a quarantine species in the Kyrgyz Republic. It is one the most destructive pests of hardwood forests and fruit trees. This pest was introduced into the Kyrgyz Republic from apple orchards in the Almaty regions of Kazakhstan and China. In 2005, the fall webworm was recorded in the flood plain forests and urban areas. At the moment, the total area infested by this pest is approximately 700 ha (Quarantine Inspection Bulletin of Kyrgyzstan, 2005).

Hyphantria cunea has a very wide host range across several plant families. It is known to feed on over 600 species of plants and trees including alder (*Alnus* spp.), willow (*Salix* spp.), birch (*Betula* spp.), cottonwood (*Populus* spp.), pecan and hickory (*Carya* spp.), walnut (*Juglans* spp.), elm (*Ulmus* spp.), maples (*Acer* spp.), persimmon (*Diospyros* spp.), sweetgum (*Liquidambar* spp.), and fruit trees. Maples are particularly affected in the Kyrgyz Republic. They are significant defoliators and can cause considerable damage including defoliation and tree stress. The fall webworm is native to North America where it occasionally causes considerable damage, particularly in shade trees and ornamentals. The fall webworm is a major pest of trees in Europe and Asia.

The females lay many egg masses which consist of large numbers of eggs. The eggs hatch enmass and the larvae are gregarious throughout most of their life stages. The larvae feed in colonies on the foliage of a number of broadleaf species and construct large webs or tents (Schmutzenhofer *et al*., 1996). Only when they are in the final larval instar do they feed as isolated individuals. They pupate in the soil. Depending on the climate there are between one and four generations per year.
http://www.forestpests.org/southern/foresttentcat.html
http://www.bugwood.org/factsheets/webworm.html
http://www.forestry.ubc.ca/fetch21/FRST308/lab5/hyphantria_cunea/webworm.html
http://warehouse.pfc.forestry.ca/pfc/2201.pdf
http://www.cfl.scf.rncan.gc.ca/IMFEC-IDECF/ficheinsecte_e.asp?id=8125
http://www.forestryimages.org/browse/subthumb.cfm?sub=158

***Sphaerolecanium prunastri* (Boyer de Fonscolombe)**

Other scientific names:
Homoptera: Coccidae
Common names: globose scale; plum scale
Host type: broadleaf
Hosts: *Prunus* spp.

The globose scale, *Sphaerolecanium prunastri*, is a common and harmful soft scale species which attacks *Prunus* spp. and other stone fruit trees throughout the Holarctic region.
http://www.forestpests.org/subject.html?sub=8298

Diseases

Indigenous diseases

The most widespread indigenous diseases impacting planted forests in the Kyrgyz Republic include *Phellinus pini* var *abietis*, *Fomitopsis pinicola*, *Armillaria mellea* and to a lesser extent, *Fomitopsis annosa*.

Armillaria mellea (Vahl) P. Kumm.

Other scientific names: *Agaricus melleus* Vahl; *Agaricus sulphureus* Weinm.; *Armillaria mellea* var. *glabra* Gillet; *Armillaria mellea* var. *maxima* Barla; *Armillaria mellea* var. *minor* Barla; *Armillaria mellea* var. *sulphurea* (Weinm.) Fr.; *Armillariella mellea* (Vahl) P. Karst.; *Clitocybe mellea* (Vahl) Ricken; *Lepiota mellea* (Vahl) J.E. Lange
Basidiomycota: Marasmiaceae
Common names: Armillaria root disease; honey mushroom; shoestring root rot
Host type: conifer
Hosts: *Picea* spp.

Armillaria mellea is a common pathogen of trees, woody shrubs and some herbaceous plants, causing root, root-collar and butt rot. They invade trees through the bark of the major roots, progressively destroying the living root tissues and leading to serious decline and ultimate death of their hosts. Symptoms of infestation are premature autumn coloration and leaf drop, stunting of growth, yellowing or browning of the foliage, a general decline in the vigour of the plant, and twig, branch and main stem dieback. Such a decline usually occurs over several years but may appear to progress very quickly as the tree shows advanced symptoms of decline and death. As decline progresses, decay of the buttress roots and the lower trunk is evident. Small plants die quickly after the first symptoms appear with large trees surviving for a number of years. A severely infected tree also exudes resin, gum or a fermenting watery liquid from the lower trunk.

A. mellea is mainly a pathogen of broadleaved trees in ornamental parklands, natural woodlands, fruit orchards, etc, but it can kill young coniferous trees (pines, spruce, etc.) planted in sites where the broadleaved species were felled.
http://www.na.fs.fed.us/spfo/pubs/fidls/armillaria/armillaria.htm
http://www.forestryimages.org/browse/subimages.cfm?sub=821
http://www.mykoweb.com/CAF/species/Armillaria_mellea.html
http://www.mushroomexpert.com/armillaria_mellea.html
http://web.aces.uiuc.edu/vista/pdf_pubs/602.pdf
http://helios.bto.ed.ac.uk/bto/microbes/armill.htm

Cenangium ferruginosum Fr.

Other scientific names: *Cenangium abietis* (Pers.) Rehm; *Peziza abietis* Pers
Ascomycota: Helotiaceae
Common names: silver fir canker; Cenangium limb canker
Host type: conifer
Hosts: *Pinus* spp.

Cenangium canker is a fungal disease commonly found on most species of pine and on some spruce and fir species. Usually, the disease occurs on lower, shaded branches of mature trees and actually aids tree growth by removing essentially non-functional branches. The fungus also plays a role in rotting dead pine debris and promotes the return of minerals and nutrients to the soil. Occasionally pines stressed by drought, wounding, extremely cold weather or other factors will suffer twig or branch dieback from the infection by *C. ferruginosum.* The disease occurs sporadically, usually once every several years. If the disease occurs yearly on the same tree, a chronically stressful site is likely.
http://www.forestryimages.org/browse/subimages.cfm?SUB=833
http://www.indexfungorum.org/Names/SynSpecies.asp?RecordID=234580
http://plantclinic.cornell.edu/FactSheets/cenangium/cenangium.htm

***Fomitopsis pinicola* (Sw.) P. Karst.**

Other scientific names: *Antrodia serpens* var. *tuber* P. Karst.; *Antrodia tuber* (P. Karst.) P. Karst.; *Boletus fulvus* Schaeff.; *Boletus marginatus* Pers.; *Boletus pinicola* Sw.; *Boletus semiovatus* Schaeff.; *Boletus ungulatus* Schaeff.; *Favolus pinihalepensis* Pat.; *Fomes albus* (Lázaro Ibiza) Sacc. & Trotter; *Fomes cinnamomeus* (Trog) Sacc.; *Fomes lychneus* Lázaro Ibiza; *Fomes marginatus* (Pers.) Fr.; *Fomes pinicola* (Sw.) Fr.; *Fomes pinicola* var. *marginatus* (Pers.) Overh.; *Fomes pini-halepensis* Pat.; *Fomes subungulatus* Murrill; *Fomes thomsonii* (Berk.) Cooke; *Fomes ungulatus* (Schaeff.) Sacc.; *Fomitopsis subungulata* (Murrill) Imazeki; *Friesia rubra* Lázaro Ibiza; *Ganoderma rubrum* (Lázaro Ibiza) Sacc. & Trotter; *Ischnoderma helveolum* (Rostk.) P. Karst.; *Mensularia alba* Lázaro Ibiza; *Mensularia marginata* (Pers.) Lázaro Ibiza; *Piptoporus helveolus* (Rostk.) P. Karst.; *Placodes helveolus* (Rostk.) Quél.; *Placodes marginatus* (Pers.) Quél.; *Placodes pinicola* (Sw.) Pat.; *Polyporus cinnamomeus* Trog; *Polyporus helveolus* Rostk.; *Polyporus marginatus* Fr.; *Polyporus marginatus* (Pers.) Fr.; *Polyporus parvulus* (Lázaro Ibiza) Sacc. & Trotter; *Polyporus pinicola* (Sw.) Fr.; *Polyporus ponderosus* H. Schrenk; *Polyporus semiovatus* (Schaeff.) Britzelm.; *Polyporus thomsonii* Berk.; *Pseudofomes pinicola* (Sw.) Lázaro Ibiza; *Scindalma cinnamomeum* (Trog) Kuntze; *Scindalma semiovatum* (Schaeff.) Kuntze; *Scindalma thomsonii* (Berk.) Kuntze; *Scindalma ungulatum* (Schaeff.) Kuntze; *Trametes pinicola* (Sw.) P. Karst.; *Ungularia parvula* Lázaro Ibiza; *Ungulina marginata* (Pers.) Bourdot & Galzin; *Ungulina marginata* (Fr.) Pat.
Basidiomycota: Fomitopsidaceae
Common names: brown crumbly rot; brown cubical rot; Pinicola brown crumbly rot; red belt fungus; root rot; pinicola conk
Host type: conifer
Hosts: *Picea* spp.

Fomitopsis pinicola is one of the most damaging decay fungi in old-growth forests. The fungus can cause heart rot in living trees but it is mainly involved in decomposing the wood of trees that have been killed by other pathogens. Infection generally begins in an existing wound on the tree. Infected dead trees are subject to windthrow and top-breakage making them high-risk hazard trees.
http://www.pfc.cfs.nrcan.gc.ca/diseases/CTD/Group/Heart/heart5_e.html
http://www.cfl.scf.rncan.gc.ca/imfec-idecf/fichemaladie_e.asp?id=18
http://www.fs.fed.us/r1-r4/spf/fhp/field_guide/28redbeltf.htm

http://www.forestryimages.org/browse/subthumb.cfm?sub=513

***Heterobasidion annosum* (Fr.) Bref.**

Other scientific names: *Boletus annosus* (Fr.) Spreng.; *Boletus cryptarum* Bull.; *Fomes annosus* (Fr.) Cooke; *Fomes annosus f. cryptarum* (Bull.) Bondartsev; *Fomes cryptarum* (Bull.) Sacc.; *Fomitopsis annosa* (Fr.) P. Karst.; *Friesia annosa* (Fr.) Lázaro Ibiza; *Heterobasidion annosum f. cryptarum* (Bull.) Domański, Orloś & Skirg.; *Heterobasidion cryptarum* (Bull.) Rauschert; *Physisporus makraulos* (Rostk.) P. Karst.; *Placodes annosus* (Fr.) Quél.; *Polyporus annosus* Fr.; *Polyporus cryptarum* (Bull.) Fr.; *Polyporus fuscus* (Lázaro Ibiza) Sacc. & Trotter; *Polyporus irregularis* Underw.; *Polyporus makraulos* Rostk.; *Polyporus marginatoides* E.H.L. Krause; *Polyporus scoticus* Klotzsch; *Polyporus subpileatus* Weinm.; *Polystictoides fuscus* Lázaro Ibiza; *Polystictus cryptarum* (Bull.) W.G. Sm.; *Poria cryptarum* (Bull.) Gray; *Poria macraula* (Rostk.) Quél.; *Pycnoporus annosus* (Fr.) P. Karst.; *Scindalma annosum* (Fr.) Kuntze; *Scindalma cryptarum* (Bull.) Kuntze; *Spongioides cryptarum* (Bull.) Lázaro Ibiza; *Trametes annosa* (Fr.) G.H. Otth; *Trametes radiciperda* R. Hartig; *Ungulina annosa* (Fr.) Pat.; *Ungulina annosa f. cryptarum* (Bull.) Bourdot & Galzin; *Ungulina annosa f. makraulos* (Rostk.) Bourdot & Galzin
Basidiomycota: Bondarzewiaceae
Common names: Annosus root rot; Annosus butt rot
Host type: conifer
Hosts: *Picea* spp.

Heterobasidion annosum is found throughout the north temperate regions of the world and can result in root rot, butt rot, reduced growth, and mortality of host trees. It is a facultative parasite of plantation grown softwood timbers which kills trees and causes heavy losses from heart rot. Trees younger than 15 years that have a major portion of their root system killed by *H. annosum* exhibit crown symptoms typical of other root diseases, such as reduction in leader and branch growth, chlorotic foliage, and a distress cone crop. In more mature trees, however, the fungus causes butt rot and external symptoms are not readily discernible. Trees with extensive decay in the structural roots are subject to windthrow, and groups of windthrown trees may indicate the presence of pockets of annosus root rot.

In the past 30 years, the incidence and damage caused by this fungus has increased greatly, particularly in planted forests in Europe and parts of the southeastern United States. This increase has been attributed to spacing and thinning operations that create conditions favorable for spread of the fungus. In Scandinavia it has been reported to cause forest yield losses varying from 30 to 90 percent, and in southeast Europe it has been described as one of the most devastating diseases in conifer forests. In the Kyrgyz Republic, it has been recorded damaging planted spruce forests.
http://www.bugwood.org/factsheets/98-031.html
http://www.forestryimages.org/browse/subthumb.cfm?sub=519
http://www.forestpests.org/southern/annosusbuttrot.html
http://www.pfc.cfs.nrcan.gc.ca/diseases/hforest/Pests/annorrot_f.html
http://www.pfc.forestry.ca/diseases/ctd/Group/Root/root3_e.html
http://www.pfc.cfs.nrcan.gc.ca/pathology/rootd/annosus_e.html

http://ceres.ca.gov/foreststeward/pdf/treenote6.pdf#search=%22Fomitopsis%20annosa%20%22
http://helios.bto.ed.ac.uk/bto/microbes/heterob.htm

***Inonotus hispidus* (Bull.) P. Karst.**
Other scientific names: *Polyporus hispidus* (Bull.) Fr.; *Boletus hispidus* Bull.; *Inonotus hirsutus* (Scop.) Murrill; *Phaeoporus hispidus* (Bull.) J. Schröt; *Polyporus endocrocinus* Berk.; *Boletus spongiosus* Lightf.; *Boletus velutinus* Sowerby; *Boletus villosus* Huds.; *Hemidiscia hispida* (Bull.) Lázaro Ibiza; *Inodermus hispidus* (Bull.) Quél.; *Polystictus hispidus* (Bull.) Gillot & Lucand; *Xanthochrous hispidus* (Bull.) Pat.
Basidiomycota: Hymenochaetaceae
Common names: hispidus canker; ash heart rot; walnut heart rot; shaggy bracket
Host type: broadleaf
Hosts: *Acer* spp.

Inonotus hispidus causes cankers in trees which are large, elongate, sunken in the center and bordered by callus folds. Infected stems become spindle-shaped. A small branch stub may be found near the center of the canker where the infection started. In the Kyrgyz Republic, this species has been reported to infest pistaccio trees in naturally regenerating forests and maples in planted forests.
http://www.forestpests.org/subject.html?SUB=886
http://www.fs.fed.us/r8/foresthealth/pubs/oakpests/p40.html
http://www.cabicompendium.org/NamesLists/FC/Full/INONHI.htm

***Laetiporus sulphureus* (Bull.) Murrill**
Other scientific names: *Agarico-carnis flammula* Paulet; *Agarico-pulpa styptica* Paulet; *Agaricus speciosus* Battarra; *Boletus citrinus* Lumn.; *Boletus coriaceus* Huds.; *Boletus imbricatus* Bull.; *Boletus lingua-cervina* Schrank; *Boletus ramosus* Bull.; *Boletus sulphureus* Mérat; *Boletus sulphureus* Bull.; *Boletus tenax* Bolton; *Boletus tenax* Lightf.; *Ceriomyces aurantiacus* (Pat.) Sacc.; *Ceriomyces neumanii* Bres.; *Cladomeris casearius* (Fr.) Quél.; *Cladomeris imbricatus* (Bull.) Quél.; *Cladoporus sulphureus* (Bull.) Teixeira; *Daedalea imbricata* (Bull.) Purton; *Grifola sulphurea* (Bull.) Pilát; *Laetiporus cincinnatus* (Morgan) Burds., Banik & T.J. Volk; *Laetiporus speciosus* Battarra ex Murrill; *Laetiporus sulphureus f. aurantiacus* (Pat.) Bondartsev; *Laetiporus sulphureus f. ramosus* (Quél.) Bondartsev; *Leptoporus casearius* (Fr.) Quél.; *Leptoporus imbricatus* (Bull.) Quél.; *Leptoporus ramosus* (Bull.) Quél.; *Leptoporus sulphureus* (Bull.) Quél.; *Merisma imbricatum* (Bull.) Gillet; *Merisma sulphureus* (Bull.) Gillet; *Polypilus casearius* (Fr.) P. Karst.; *Polypilus imbricatus* (Bull.) P. Karst.; *Polypilus sulphureus* (Bull.) P. Karst.; *Polyporellus rubricus* (Berk.) P. Karst.; *Polyporus candicinus* (Scop.) J. Schröt.; *Polyporus casearius* Fr.; *Polyporus cincinnatus* Morgan; *Polyporus imbricatus* (Bull.) Fr.; *Polyporus ramosus* (Bull.) Gray; *Polyporus rostafinskii* Błoński; *Polyporus rubricus* Berk.; *Polyporus sulphureus* (Bull.) Fr.; *Polyporus todari* Inzenga; *Ptychogaster aurantiacus* Pat.; *Ptychogaster aureus* Lloyd; *Sistotrema sulphureum* (Bull.) Rebent.; *Stereum speciosum* Fr.; *Sulphurina sulphurea* (Quél.) Pilát; *Tyromyces sulphureus* (Bull.) Donk
Basidiomycota: Polyporaceae

Common names: brown cubical rot; chicken mushroom; sulphur fungus rot; sulphureus brown cubical rot
Host type: broadleaf
Hosts: *Populus* spp.; *Salix* spp.

Laetiporus sulphureus is a pathogenic and saprophytic fungus that causes a brown cubicle rot of roots, butts, and heartwood of living trees. Fruiting bodies are often not formed until years after the fungus is well established, so when present, they indicate significant internal defect of host trees. The rot is generally restricted to the butt log. Decay caused by the fungus ruins the best parts of trunks of older trees and therefore impacts the wood and wood products industry. *L. sulphureus* affects a wide range of coniferous and deciduous hosts and in the Kyrgyz Republic, it is particularly associated with pistachio trees in naturally regenerating forests and poplar and willow planted forests.
http://www.forestryimages.org/browse/subthumb.cfm?sub=535
http://www.forestpests.org/ash/sulfurfungus.html
http://www.pfc.forestry.ca/diseases/ctd/Group/Heart/heart8_e.html
http://www.cfl.scf.rncan.gc.ca/imfoc-idwcf/fichemaladie_e.asp?id=1000014

***Phellinus chrysoloma* (Fr.) Donk**

Other scientific names: *Daedalea chrysoloma* (Fr.) Cooke & Quél.; *Daedalea indurata* Velen.; *Fomes abietis* P. Karst.; *Phellinus abietis* (P. Karst.) H. Jahn; *Phellinus pini* var. *abietis* (P. Karst.) Pilát; *Physisporus chrysoloma* (Fr.) P. Karst.; *Polyporus abietis* (P. Karst.) Vleugel; *Polyporus chrysoloma* Fr.; *Poria chrysoloma* (Fr.) Cooke; *Porodaedalea chrysoloma* (Fr.) Fiasson & Niemelä; *Porodaedalea chrysoloma* (Fr.) Imazeki; *Trametes abietis* (P. Karst.) Sacc.; *Xanthochrous abietis* (P. Karst.) Bourdot & Galzin; *Xanthochrous pini* subsp. *abietis* (P. Karst.) Bourdot & Galzin; *Xanthochrous pini* var. *abietis* (P. Karst.) Bourdot & Galzin
Basidiomycota: Hymenochaetaceae
Common names:
Host type: conifer
Hosts: *Picea* spp.

Introduced diseases

No records were available for introduced diseases affecting the planted forests of the Kyrgyz Republic.

Other pests

Indigenous other pests

***Aceria* spp.**

Other scientific names:
Acarina: Eriophyoidae
Common names:
Host type: broadleaf

Hosts: *Acer* spp.

***Eriophyes dispar* Nal.**

Other scientific names:
Acarina: Eriophyidae
Common names:
Host type: broadleaf
Hosts: *Populus* spp.

***Eriophyes parapopuli* Keifer**

Other scientific names: *Aceria parapopuli*; *Cosetacus parapopuli*
Acarina: Eriophyidae
Common names: poplar bud gall mite
Host type: broadleaf
Hosts: *Populus* spp.

Hosts of the poplar bud gall mite include various species of poplars, cottonwoods, and aspens. This species prevents leaf buds from developing into normal leaves and stems. Instead, the buds develop into woody galls 3-4 cm in diameter. The galls have a cauliflower-like appearance and are dark green early in the season, turning to a brick-red or blackish-brown colour by late summer. Older galls become hard, have ridged and furrowed surfaces, and turn a tan or grayish colour.

Galls are typically attached to one-year-old twigs. Lower branches are usually more heavily infested and affected branches may be stunted, crooked or have sparse foliage. Several years of repeated attack may cause the ends of the branches to die back beyond the galls. Leaf loss caused by gall formation may cause stress in the tree, making it more susceptible to other problems such as drought, frost injury or attacks by wood borers.
http://www.insectimages.org/browse/subimages.cfm?SUB=10564
http://extension.usu.edu/files/publications/factsheet/95.pdf
http://nofc.cfs.nrcan.gc.ca/publications/leaflets/poplar_gallmite_e.html

***Phyllocoptes aegerenus* Nal.**

Other scientific names:
Acarina: Eriophyoidae
Common names:
Host type: broadleaf
Hosts: *Populus* spp.

Introduced other pests

No records were available for introduced other pests (e.g. mites, nematodes, mammals, etc.) affecting the planted forests of the Kyrgyz Republic.

Diebacks and other conditions

No records were available for diebacks and other conditions affecting the planted forests of the Kyrgyz Republic.

Capacity for forest health protection

Government level

The Ministry of Forestry (later transformed into State Agency of Environment Protection and Forestry) was created in 1947. One of its central tasks has been to enact measures that would restore forest areas that were depleted in 1930s and 1940s, during which time almost 7 million cubic meters of timber and firewood were harvested. The careless logging during this period gave rise to severe soil erosion, destruction of natural reforestation processes, and other protective functions of forests and watershed balance. During this time, natural reforestation processes were also disrupted by overgrazing of livestock. However, since 1948 more than 200 000 hectares of forests have been planted throughout the Republic in a concentrated effort to conserve, reforest, and expand the nation's forested areas.

In 1999, the Kyrgyz Republic adopted a new code officially recognizing the concept of collaborative forest management. As a result of the work of the National Working Group (NWG) and main stakeholders, a resolution No. 377 – About introduction of collaborative forest management in Kyrgyz Republic – was adopted by the Government on July 27 2001. Collaborative forest management (CFM) is a completely new concept in the Kyrgyz Republic and has been implemented by transfer of forest fund lands for forest use on a long-term basis to local people live in forest territory or in surroundings.

Forests are the national wealth in the Kyrgyz Republic. They are all property of the State and in spite of the small area, forests play an important role in the development of the economy and improvement of the environment. As most of the forests in Kyrgyz Republic are mountain forests, special attention needs to be given to their protective functions.

Today forestry, as well as other sectors in the country, is facing problems related to the changing economic environment and policy. Transition to market needs some adaptations (bottom-up planning procedures, stakeholder's participation, commercial approach, etc.). For the conservation and protection of the forest resources, a new national forest policy will be defined with Government support in order to ensure the conservation and use of the resources according to common principles of sustainable development adapted to the socio-economic and ecological situation in the country as well.

After the collapse of the Soviet Union many changes occurred in the forests creating impacts on both local populations and the environment. Changes in employment resulted in more people becoming dependent on agriculture and harvesting natural resources for daily needs as well as for providing income. The reduced ability to protect the forests from pests and diseases and overuse due to lack of financial resources has caused considerable negative impacts on the local economy.

Considering this challenge, the role of forest health protection in solving the complicated

problems facing the forests sector is increasing. In order to increase the input of science into forestry, research and education should be coordinated and established and special professional schools for the training of forest health protection workers needs to be organized. There is a need for creation of a national database of forest pests and diseases and definition of a main strategy for forest health protection in the Kyrgyz Republic. At the moment one of the main tasks in the forest protection departments deals with forest diseases. In the Kyrgyz Republic, forest pathology studies and research are not fully developed.

Monitoring and detection

A number of investigations on forest insects and a few investigations on diseases impacting natural and planted forests in the Kyrgyz Republic have been conducted. A risk rating system, based on forest characteristics has been developed for the phytophagous insects. The gypsy moth (*Lymantria dispar*) remains one of the most serious pests in the unique walnut-fruit forests. Monitoring and detection systems have not been developed for the introduced pest species *Sphaerolecanium prunastri* (Fonsc) and the quarantine species *Hyphantria cunea.*

Data management

Tools for data management need to be developed in the Kyrgyz Republic.

Pest management

Forest health and protection activities pertaining to pests and diseases need to be strengthened. The implementation of policies relating to forest health and protection requires improvement of the forest sector activities in Kyrgyz Republic. A new central unit should be established to deal with monitoring and auditing, methodology, and coordination of international projects. Integrated forest pest management tools need to be considered, a detailed analysis of the current conditions needs to be done and the use chemical pesticides needs to be addressed. New control methods for forest pest and disease will be introduced with priority given to biological control.

Private landowners

All forest lands in the Kyrgyz Republic are owned by the state.

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Index

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

Annex 1. The forests of the Kyrgyz Republic.

Naturally regenerating forests

The walnut-fruit forests

Globally unique naturally regenerating forests of walnut and fruit-bearing tree species, occurring within an altitudinal band of 800-2400 m above sea level, play a major role among locally available natural resources. These forests are unique due to their particular species composition and their high economic value. Having experienced long periods of human exploitation, the historical natural cover of these forests in southern Kyrgyzstan is hard to reconstruct (Lavrenko and Sokolov, 1949; Gan, 1970). The original cover may be in the order of up to 600 000 ha, while at present the area of dense walnut-fruit forest stands is estimated to be as low as 30 000 ha (Müller and Vienglovsky, 1998; Scheuber, Müller and Köhl, 2000). However, the remaining forest cover is still quite significant in a country with a total forest cover of only 4.5 percent of the total land area (Maydell, 1983; Scheuber, Müller and Köhl, 2000). In spite of this huge decrease, southern Kyrgyzstan still boasts the largest naturally-occurring area of walnut-fruit forests in the world (Hemery and Popov, 1998). The walnut-fruit forests are composed of walnut (32.6 percent), pistachio (29.4 percent), apple (23.5 percent) and maple (14.5 percent). The most common associates of the walnut (*Juglans regia*) are cherry plum (*Prunus sogdiana*) and Sievers' apple (*Malus sieversii*). Other naturally occurring species that bear edible fruit belong to the genera *Cerasus*, *Pyrus*, *Crataegus*, *Ribes*, *Berberis* and others (Gan and Vienglovsky, 1997; Epple, 2001).

These forests are considered a biodiversity hotspot of international significance and an important resource for the local rural population. They are characterized by a remarkably high biodiversity at the genetic, species, and ecosystem levels (Krassilov, 1995; Turok, 1997; Hemery and Popov, 1998). They harbour extraordinarily high species numbers including more than 5000 plant species (180 woody species), 150 bird and 40 mammal species (Kolov, 1998). At the same time, the walnut-fruit forest zone is inadequately covered within preserves of Kyrgyzstan (Pryde and Braden, 1998).

The walnut-fruit forests are of considerable importance for sustaining the livelihoods of over 100 000 people living in the forest area (Favre, 1997). Although agriculture (cropping and, to a lesser extent, animal husbandry) is the mainstay of the majority of the residents on the Leshoz territories, the forest and its products provide valuable secondary income. The local population uses a wide range of various forest products, albeit to varying extents. Many products, such as fuelwood which has become increasingly important since Kyrgyzstan's independence due to the massive increase in the price of coal, are still gathered primarily for personal use (Sorg and Vienglovsky, 2001). Additional income is also generated from the collection and sale of nuts and fruit (Juldashev and Messerli, 2000). Often, forest products can be partly processed on farms (dried fruit, herbal teas, wild fruit jams, etc.), leading to a considerable increase in profit for households in the surrounding areas. Since many forest products enter the regional economy, be it non-wood forest products (especially nuts and fruit, mushrooms, medicinal herbs etc.) or wood products (to a lesser extent), the forests offer substantial potential for the rural development of surrounding areas. Walnut trees and a wide range

of other fruits of worldwide economic importance originate in the mountains of central Asia and their forests (Walter and Breckle, 1986).

The walnut-fruit forests greatly contribute to the regulation of water supply to the Fergana valley and offer protection against soil erosion. Environmental services are currently threatened by widespread overuse of forest resources, which has adverse effects on the hydrological cycle and on soil-protective functions of forests. As a result, floods, mudslides and landslides increasingly occur, leading to soil erosion and loss of arable lands (Matveev, 1992; Stadler, 1995). In spring, the water flows down from the mountains at an accelerating pace so that during summer less water is available for irrigation. Villages are endangered by landslides and many people have to leave their houses due to flood damages (UNDP, 1998). Moreover, other forest issues of regional importance are their vital role as a place of relaxation and as a focus for the gradual growth in tourism.

Most of the natural walnut fruit forests are over-mature and therefore far from being productive. Plantations are in general considered to be too dense for good nut production (Sorg *et al.*, 2000). Thinning was barely executed under the very restrictive forest legislation during the Soviet time, which had a strong emphasis on the conservation of the forest area. Therefore, unregulated grazing in the forests and intensive nut gathering in easy accessible forests are assumed to be the most important reasons for the reported lack of natural regeneration in most of the forests (Musuraliev, 1998). As a result, many walnut and mixed stands are in a poor state from a silvicultural perspective (Sorg and Venglovskii, 2001).

The conservation and sustainable management of these unique forests is currently uncertain. New visions and approaches to the forest management, with participation of local population, to assist the conservation of the walnut-fruit forests are urgently needed.

Juniper forests

Juniper forests in southern Kyrgyzstan occupy an area of 240 000 ha or approximately 35 percent of all forests of the Republic. The mountain range of Fergana valley is characterized by low precipitation (250-600 mm per year), dry summers and high temperatures. These conditions, though ideal for juniper species, are unsuitable for many other tree species. The majority of junipers are concentrated in the southern part of the Turkestan-Alay forest vegetation area. These forests are composed primarily of *Juniperus seravschfnica* Kom., *Juniperus semiglobosa* Rgl and *Juniperus turkestanica* Kom. Historically, the juniper was widespread reaching the valleys of Central Asia. Its current distribution however is sparse and confined to a narrow, discontinuous belt over mountain slopes within an altitude of 1 800-3 200 m. Destruction of junipers in the past, lack of protection, increasing anthropogenic influence and unlimited cattle pasture has resulted not only in reduction of the juniper forests, but also has resulted in unhealthy trees, as evidenced by the presence of damaged and defective trees, which make them susceptible to insects, disease and other factors. The degradation of mountain vegetation is also accompanied by the progressive drying of slopes and climatic desertification.

Planted forests

Spruce forests

Planted spruce forests of Kyrgyzstan are basically composed of uneven-age forest stands with prevalence of mature and over-mature trees. Mountain spruce forests of Kyrgyz Republic are composed of one main tree species, *Picea schrenkiana*, which represents 12.7 percent of the total forest area.

Fir forests

Fir forests grow in the mountain ranges of Lake of Issuk-Kul and Naryn water basin of northern Kyrgyzstan and in the Talas and Kyrgyz mountain ranges in the south.

The flood plain forests

In the mountain regions, flood plain forests are located by the Naryn, Chy, Tup, Talas, Sysamur, Djergalan, Yassu rivers and many other a small rivers where they play a role in the regulation of water supply and protection against soil erosion. The types of the flood plain forests depend on the environmental conditions and species interactions. They are grown by rivers and mountain ranges and are composed of various species such as *Populus nigra, P. diversifolia, Salix alba, S. cinerea, Eleagnus angustifolia, Tamarix laxa, Hippophae rhamnoides* and *Ulmus* spp. In 2003, the State Forest Fund estimated that the flood plain forests were composed of 2 100 ha of *Salix* wood, 24 500 ha of *Salix* shrubs, 7 900 ha of *Populus* spp., and 6 300 ha of *Hippophae* spp. Human pressures have significantly decreased the density of wood in the flood plain forests.