Forest pests in the South Pacific region: A review of the major causal agents of tree disorders

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Introduction

Major insect pests and fungal diseases of plantation forests in the Asia Pacific region are the focus of the literature review. These have been considered in the light of their potential threat to the plantations of the target countries given the increase in inter and intra-island traffic of living plant material, timber and timber products. For each species, information is provided on their distribution, type of damage and known economic importance. Expanded lists of insect pests and diseases as well as forest plantation tree species for the region are given in Appendices 1 –3.

Insects

Agrilus opulentus Kerremans, *Agrilus viridissimus* Cobos – Jewel beetles

Agrilus is a cosmopolitan genus containing well over 1000 species. Most of these are of little or no economic importance, but a few species in Asia and the Pacific are serious pests in forest plantations, causing growth loss, stunting and tree mortality (Speight and Wylie, 2001).

Attack is often heaviest on trees which are stressed, for example *Eucalyptus deglupta* growing on badly drained soils (Roberts, 1987). Infested trees show loss of annual increment, and small and suppressed trees are girdled and killed. Estimated growth

losses in *E. deglupta* plantations at Madang in Papua New Guinea due to *Agrilus opulentus* totaled US $2.5 million over the 10 year rotation (Mercer, 1990).

***Amblypelta cocophaga* China - shoot feeding bug**
This insect is a major pest of *Eucalyptus deglupta* and *Campnosperma brevipetiolata* and a minor pest of a number of other forest tree species in the Solomon Islands. Exotic trees which are badly damaged by *A. cocophaga* include *Sterculia pattersonii* and *Flindersia brayleyana*, which suffer serious dieback of the leading shoot. Young side shoots of *Araucaria hunsteinii* may be killed and about 2 cm of the tip of the shoot may rot. This leads to very dense bushing and slow growth. Indigenous species attacked include *Canarium indicum* and *Calophyllum kajewskii* (Bigger, 1988).

The genus *Amblypelta* extends from Indonesia to Australia, New Caledonia and Vanuatu but has the greatest concentration of species in the Solomon Islands.

***Ceroplastes rubens* Maskell - scale insect**
The genus *Ceroplastes* occurs widely throughout the tropics and contains many species which feed off forest trees. Few are serious pests, but some can reduce tree vigour and even cause mortality. *Ceroplastes rubens*, commonly known as pink wax scale or red wax scale occurs throughout the Australian and Oriental regions.

In Papua New Guinea, Merrifield and Howcroft (1975) reported severe attack of *Pinus caribaea* by *Ceroplastes rubens*, heavily infested trees being characterised by sparse crowns, considerable darkening of foliage by a dense covering of sooty moulds and reduced height increment. *C. rubens* is also a sporadic pest of *Pinus taeda* and *P. caribaea* in Queensland, Australia (Speight and Wylie, 2001). The sooty mould interferes with photosynthesis and the sap feeding can cause death of needles and twigs.

***Coptotermes elisae* (Desneaux) – Subterranean termite**
Coptotermes elisae has caused considerable mortality among plantations of *Araucaria cunninghamii* and *Araucaria hunsteinii* in sub-montane areas of Papua New Guinea (Gray and Buchter, 1969). In some compartments incidence of infestation was about 7% and nearly all attacked trees died.

***Crossotarsus extemedentatus* (Fairmaire) - Ambrosia beetle**
In the Pacific it has been recorded in the Solomon Islands, Fiji, Tonga, the Kermadec Islands, Niue Island, Western Samoa, the Cook Islands, the Society Islands and Hawaii (Bigger, 1988).

This beetle prefers to attack newly felled trees or those which are injured or sickly, but in Fiji it has caused considerable damage to apparently healthy plantations of *Swietenia macrophylla* (Roberts, 1977). A number of other living hosts were recorded by Roberts including *Cordia alliodora, Terminalia brassii, T. inorensis, T. superba, Cedrela mexicana, Khaya anthotheca, Eucalyptus deglupta, E. citrodora* and *Maesopsis eminii* among the exotics and *Myristica castaneifolia* and *Nauclea diderichii* among the native species. Similar attacks on *Eucalyptus citriodora* and *E. grandis* are reported by Beaver (1976) from Samoa and there are reports of damage to *S. macrophylla* in French Polynesia (Gray, 1974). Elsewhere, living trees do not seem to be attacked to any great extent (Bigger, 1988).

***Hyblaea puera* (Cramer) – Teak defoliator**
The teak defoliator *Hyblaea puera* is one of the best known of the lepidopterous defoliators in the tropics, both because of the value of the principal tree on which it feeds and because of its pantropical distribution (Speight and Wylie, 2001). Defoliation may affect future height growth and quality if buds are killed. The frequency of severe defoliation is high in stands aged 11 – 45 years and is at its maximum in stands 21 - 30 years old.

Nair *et al*. (1985, 1996) studied the impact of defoliation by *H. puera* over the period 1978 to 1982 in young teak plantations at Kerala, India. They found that the insect caused very significant loss of increment, 44% of the potential growth volume remaining unrealised because of its attack

***Hylurdrectonus araucarariae* Schedl - Branchlet mining beetle**
This scolytid occurs only in Papua New Guinea and has just a single host, *Araucaria cunninghamii*, commonly known as hoop pine. *H. araucariae* is a branchlet-miner (Gray and Lamb, 1975). The damage caused by this insect to the country's main plantations of hoop pine at Bulolo and Wau resulted in the abandonment of planting of this species there in the late 1960's (Speight and Wylie, 2001).

Attack by *H. araucariae* on hoop pine is primary, nearly all trees in an outbreak area being infested regardless of condition. However, there is a definite age effect, trees aged 2.5 – 12 years being the most susceptible (Gray 1976). The insect is comparatively rare in natural stands of hoop pine but has infested approximately 47.5% of major plantations at Bulolo and 91% at Wau (Gray, 1975) Considerable growth loss and high tree mortality has been recorded in severely infested stands, particularly on poor sites.

***Hypsipyla robusta* (Moore) - Cedar shoot boring caterpillar**
These shoot borers are amongst the most economically important insect pests in tropical forestry, virtually preventing the cultivation of mahoganies (*Swietenia* spp., *Khaya* spp.), cedars (*Cedrella* spp., *Toona* spp.) and other valuable Meliaceae (Newton *et al*., 1993).

Tunnelling by the larvae in the shoots causes shoot mortality, growth reduction, branching and poor tree form. Repeated attacks can result in tree death. Trees may be attacked from the nursery stage through to maturity, but attacks up to the pole stage are most critical from a silvicultural point of view. Newton *et al*. (1993) cite many examples of damage caused by *Hypsipyla* spp. through the tropics, with up to 100% of plantings affected in some cases.

***Ips* sp. - Bark beetles**
The genus *Ips* contains more than 60 species (Wood, 1982) and is one of the best known groups of bark beetles, with a worldwide distribution. Several species occur in the tropics and subtropics, and some of these are important pests of *Pinus* spp. They can attack living trees, freshly felled logs and unbarked pine slash (Speight and Wylie, 2001).

Commonly, *Ips* are secondary pests, but sometimes they can assume a primary role, causing tree mortality, particularly when populations are very high (Yates, 1972).

Following fires in south-east Queensland in 1994, which affected over 8000 ha of *Pinus elliottii, P. taeda* and *P. caribaea* plantations, *I. grandicollis* attacked fire damaged trees after 6 weeks and was a significant pest in most areas after 10 weeks (Wylie *et al*., 1999). Sap-staining, caused by fungi carried by the beetle, became significant in attacked stems at the completion of the insect's life cycle. This attack necessitated rapid salvage of the timber and its storage under water spray. The losses caused by *I. grandicollis* and sap stain following these fires were estimated at several million Australian dollars, most of this being in privately owned plantations where salvage was delayed for several months (Wylie *et al.* 1999).

***Mictis profana* (Fabricius) - Sap sucking bug**
Feeds on a broad range of native and introduced plants, including species of *Eucalyptus*, *Acacia* and *Cassia*. It is regarded as a pest of *Acacia* spp. in the Northern Territory (Radunz and Allwood, 1981) and has caused shoot dieback of *Acacia ampliceps* in experimental plantations near Maryborough, Queensland (Wylie and De Baar 1991). More recently it has caused severe damage to a one-year-old seed orchard of *A. auriculiformis* in North Queensland. Almost all trees, and 95% of shoot tips, were attacked resulting in dieback, loss of apical dominance and "bushing" of the trees (Wylie *et al*., 1997).

***Oxymagis horni* (Heller) - - Stem boring beetle**
In the Solomons, it is of great importance as a pest during the establishment of plantations of a number of tree species because when the tree is too young to have large branches the larvae tunnel into the main stem. The host range is wide including *Eucalyptus deglupta, E. pelita, E. tereticornis, Terminalia calamansani, T. brassii, Paraserianthes falcata, Pometia pinnata, Gmelina moluccana, Prunus schlechteri, Pentaphalangium solomonese, Schizomeria serrata* and probably many more. (Bigger, 1988).

Eucalyptus species in plantations are very prone to attack, especially *E. deglupta*. Attack on *E. deglupta* can begin when the tree is less than one year old and the earliest at which it has been observed was seven months from planting out (Bigger, 1988)

***Platypus gerstaeckeri* Chapuis - Ambrosia beetle**
In Fiji, mahogany trees, *Swietneia macrophylla*, are attacked by *P. gerstaeckeri* (Speight and Wylie, 2001). Inside plantations ,attack nearly always related to some forest operation such as thinning, pruning, or clearing, (Roberts, 1977).

Economically, the possible depredations and effects on quality by ambrosia beetle attack are very serious, reducing the financial return by some two thirds. Platypodid attack on living exotics would appear to be an expanding problem in the west Pacific, and perhaps elsewhere in the tropics. In Fiji the same insects are also known to attack living *Eucalyptus* species. (Roberts, 1977)

***Xyleutes ceramicus* (Walker) - Teak beehole borer**
Occurs from Myanmar eastward, through Indonesia, the Philippines and New Guinea into the Solomons. It is not known to extend further into the Pacific (Bigger, 1988).

In teak, attack may take place in trees of any age and because the bee holes persist in the timber the number accumulates with age. Sixty-five bee holes per tree in 60 year old trees is considered average and the largest number recorded in a very old tree was 511 (Bigger, 1998).

***Zeuzera coffeae* Nietner - Branch boring caterpillar**
It is primarily a branch borer but will also attack saplings where it may be found in the main stem (Bigger, 1998). It has a wide host range, these include several important plantation species such as *Paraserianthes falcata, Casuarina equisetifolia, Eucalyptus deglupta, Swietenia macrophylla, S. mahogani, Tectona grandis, Terminalia brassii* and *T. ivorensis* (Bigger, 1998). The pest is said to have ruined plantations of *E. deglupta* in Malaysia (Streets, 1962).

Fungal diseases

Nursery diseases

There are few reports of diseases in the nurseries producing forest planting stock in the islands of the south-west Pacific. Chaplin (1993) reported that damping-off (deaths of germinating and very young seedlings) is a recurrent problem with small-seeded species such as *Eucalyptus deglupta* Blume in the Solomon Islands. As he indicated, prevention of attack by high standards of nursery hygiene is required as cure is not possible. Chaplin reported that most seed failures of *Calophyllum kajewskii* A.C.Sm. in the Solomons was due to fungal attack. He reported that damping off can be a problem in germination beds of *Cedrella odorata* L. and very serious with germinating *E. deglupta* but that it was not a problem for *Campnosperma brevipetiolata* Volkens, *Terminalia brassii* Exell. or *T. calamansanai* (Blanco.) Rolfe.

However, microorganisms such as *Fusarium*, *Pythium*, *Phytophthora*, *Thanatephorus* and *Cylindrocladium* are associated with nursery diseases in tropical areas (Ivory and Speight 1993; Sharma *et al*. 1985). Many species of those genera are widespread, especially in tropical and sub-tropical areas and can cause nursery diseases such as damping-off, root rots, foliage blights and shoot diebacks.

Microorganisms known to cause nursery diseases that have been reported from the south-west Pacific Islands include *Calonectria quinqueseptata* Figueiredo & Namek. (anamorph *Cylindrocladium quinqueseptatum* Boedijn & Reitsma), *Glomerella cingulata* (Stoneman) Spauld. & H.Schrenk (anamorph *Colletotrichum gloeosporioides* (Penz.) Penz. & Sacc.), *Fusarium oxysporum* Schltdl., *F. solani* (Mart.) Appel & Wollenw., *Macrophomina phaseolina* (Tassi) Goid., species of *Pestalotia* and *Pestalotiopsis*, species of *Phytophthora* (*P. boehmeriae* Sawada, *P. drechsleri* Tucker and *P. meadii* McRae *Pythium* spp. (*P. irregulare* Buisman, *P. paroecandrum* Drechsler and *P. vexans* de Bary) and *Thanatephorus cucumeris*

(A.B.Frank) Donk (anamorph *Rhizoctonia solani* J.G.Kühn). Although *P. cinnamomi* Rands does not appear in the list of tree pathogens it has been reported from a number of islands in the area on crop species (Caroline Islands, Cook Islands and Fiji; Firman 1975; Zentmyer 1980).

The literature review for this discussion was largely based on records for the islands of the south-west Pacific. Nursery diseases such as powdery mildews and foliar spots which cause serious problems on *Acacia*, eucalypts (*Corymbia* and *Eucalyptus* species) and others of the plantation species in other parts of the World (Sharma *et al.* 1985) were not recorded for this area.

Plantation diseases

Most of the reports of plantation tree diseases from the south-west Pacific Islands relate to root rots caused by wood rotting fungi such as *Armillaria*, *Phellinus* and *Rigidoporus*. The most significant of these is undoubtedly *Phellinus noxius* (Corner) G.Cunn.

Phellinus noxius

Phellinus noxius (syn. *Fomes noxius* Corner) has been recorded in Fiji, Vanuatu, Tonga and Western Samoa (See the list of Pathogens of plantation forests in the southern and western Pacific). It is known to have a wide host range including a number of tree crop species (breadfruit, rubber and cocoa) and in some areas causes heavy losses in Hoop pine (*Araucaria cunninghamii* A.Cunn.) plantations (Queensland and Vanuatu Bolland 1984; Ivory 1996). *Phellinus noxius* is pantropical and occurs in Australia, south-east Asia and the Western Pacific areas between the latitudes 30N and 28°S in areas of high rainfall, usually at elevations below 500 m (Ivory 1996). The fungus is endemic in the natural forest of most of the larger islands of Oceania (Ivory 1996) where it can infect living trees as a pathogen of roots and stems, or as a perthophyte (living on dead material of living hosts) of the heartwood, and as a sparophytic decay fungus on dead wood. Infection foci in plantations arise from remnant stumps of the native forest trees that have been felled. Further infections arise during plantation thinning activities and at clearfall. There are indications in Queensland that losses will be higher in second rotation forests and that biocontrol may be an effective control practice..

Surveys in plantations of Salmwood (*Cordia alliodora* (Ruiz & Pav.) Oken) in Vanuatu and of Mahogany (*Swietenia macrophylla* King) in Fiji showed that *P. noxius* was present in most of the plantings in both countries (Ivory 1996). In the Salmwood mortality averaged 4% (nil to 35%) with another 11% missing (1 to 56%). Because *P. noxius* causes losses over a long time in forest plantation areas, a single survey will grossly underestimate the total losses; for example in one 36-tree plot in a 1933 Hoop pine plantation in Queensland confirmed deaths between 1974 and 2001 reached 69% (G..S. Pegg personal communication). Only the eight recent deaths were still evident, there was no sign of the 17 trees that had died prior to an assessment in 1988. In the Fijian Mahogany plantations losses may reach 20% in a 35-year rotation (Ivory 1996). Surveys in seven to eight-year old Hoop pine plantations in Queensland showed mortality of up to 47% (Ivory 1996).

Chaplin (1993) reported that *P. noxius* had caused serious damage in *Acacia mangium* Willd. and *Gmelina arborea* Roxb. in the Solomon Islands. He indicated that unidentified deaths of a large number of *A. cunninghamii* may be due to *P. noxius* and that the pathogen was a potentially serious threat to plantations on the Islands. Although *P. noxius* has been recorded on *C. brevipetiolata* and *S. macrophylla* the level of attack was insignificant (Chaplin 1993). Ivory (1987) listed *Pinus caribaea* Morelet, *P. merkusii* and *Araucaria* spp. among the hosts of *P. noxius* but reported that mortality in pine plantations is usually negligible.

Ivory (1996) listed a number of tree species considered to be resistant to *P. noxius* under field conditions. Those species may be colonized saprophytically when dead or severely stressed, or infected artificially whilst very young. The list includes *Campnosperma brevipetiolata* Volkens, *Endospermum macrophyllum* (Mull.-Arg.) Pax & K.Hoff and *Terminalia calamansanai* (Blanco.) Rolfe.

Pink disease *Corticium salmonicolor*

A damaging diseases in tropical forests of south-east Asia and the Pacific Islands is "Pink Disease" caused by *Corticium salmonicolor* Berk. & Broome (anamorph *Necator decretus* Massee) (Gibson 1975). It causes mortality of the major branches accompanied by leaf cast due to invasion of the cambium and resultant girdling. Severe attack can spread to the whole crown but trees are rarely killed. Trees of any age may be attacked and the spread of the disease depends on the vigor of the host and on environmental conditions. Pink disease has been reported on *Agathis macrophylla* and *Cordia alliodora* in Vanuatu and the Solomon Islands. In the Solomons, Pink disease is considered an important problem in both species (Chaplin 1993).

Hadi and Nuhamara (1997) reported that in Kalimantan, Indonesia Pink disease was found primarily on *Acacia mangium* Willd., less on *A. crassicarpa* A.Cunn. ex Benth., and absent from *A. aulacocarpa* A.Cunn. ex Benth. and *A. auriculiformis* A.Cunn. ex Benth. In a study from South Sumatra, Zulfiyah and Gales (1997) reported that Pink disease affected about 1.8% of *A. mangium* and that it was more frequent in stands with closer spacing. Severe Pink disease has been observed by Dr. B.N. Brown on *A. mangium* in East Kalimantan near Balikpapan.

Cylidrocladium blight

Calonectria quinqueseptata Figueiredo & Namek. [anamorph *Cylindrocladium quinqueseptatum* Boedijn & Reitsma] is included in the list of microorganisms reported from the south-west Pacific Islands (Espiritu Island, Vanuatu) on *Eucalyptus grandis* W.Hill and *E. urophylla* S.T.Blake. This pathogen, along with other related fungi has proved to be one of the most significant disease problems facing the plantings of some species of *Eucalyptus* in Australasia and south-east Asia.

Other root rot and wound pathogens

Other wood-decay fungi associated with plantation losses in the south-western Pacific include *Armillaria* spp.(*A. mellea* (Vahl:Fr.) P.Kumm. and *A. tabescens* (Scop.) Emel) and *Rigidoporus vinctus* (Berk.) Ryvarden. These are apparently only of minor importance compared with *P. noxius*. A fungus broadly identified as *Ganoderma lucidum* (Curtis) P.Karst. sens lat. associated with *Agathis vitiensis* (Seem.) Benth. & Hook.f. and *Pinus caribaea* in Fiji was not pathogenic on *P. caribaea* (Hood Bell

1983). *Ganoderma chalceum* (Cooke) Steyaert was reported on dicotyledonous trees from Fiji (Ivory 1989a) and *Ganoderma australe* (Fr.) Pat. (syn. *Ganoderma tornatum* (Pers.) Bres.) was reported from *Grevillea robusta* A.Cunn. in Tonga (Dingley *et al*. 1981) and caused wood rot in Fiji and the Solomon Islands (Ivory 1989a). A fungus identified as *Clitocybe tabescens* (Scop.) Bres. (this is now called *Armillaria tabescens* (Scop.) Emel) caused large scale mortality of Mahogany (*Swietenia macrophylla*) and *Pinus elliottii* Engelm. in Fiji (Sujan Singh and Bola 1981). It is possible that the later reports of *Armillaria* spp. and *A. mellea* from Fiji refer to the same fungus.

Heterobasidion annosum (Fr.:Fr.) Bref. (anamorph *Oedocephalum lineatum* B.K.Bakshi) has been reported from *Agathis macrophylla* (Lindl.) Mast., *A. vitiensis* (Seem.) Benth. & Hook.f., *Araucaria cunninghamii* and *Pinus* spp. in Fiji (Ivory 1987; 1989a; Dingley *et al*. 1981). This is a serious root-rot pathogen of conifers in the northern Hemisphere and while it occurs in Australia (Queensland and New South Wales) on conifers (*Araucaria*), there is no evidence that it is a pathogen. Ivory (1987) reported that clones of *H. annosum* from Asia and Australasia differed from the Northern Temperate clones and that it appeared to be virtually harmless in Australasia.

Chaplin (1993) reported that in the Solomon Islands *E. deglupta* was susceptible to invasion by decay fungi, especially in areas damaged by cattle. Losses in damaged areas were of the order of 10-20%, but decay was also present in areas where there had been no cattle. Chaplin estimated that in short rotation crops (8-10-years) of *E. deglupta* in close-spaced stands incipient decay could be expected in 30% of the trees. Davidson (1974) reported that *E. deglupta* was susceptible to decay when grown in plantations.

Other foliage and stem pathogens

Whole foliage and stem diseases are severe in some tropical plantation programs there is little information available on their occurrence or impact in the islands of the south-west Pacific. A number of pathogens with the potential to become problems have been reported in the scientific literature and a number of these are listed in the table on Potential disease microorganisms reported from the south-west Pacific area. Among those listed are;

Aecidium fragiforme Ces. is a leaf rust which occurs in south-east Asia, Australia (sporadically) and on Santa Cruz (Solomon Islands) (Chaplin 1993). While it is a serious disease on *Agathis dammara* (Lamb.) Rich. & A.Rich. in Java it was not considered serious in Santa Cruz (Chaplin 1993). Gall rust caused by *Atelocauda digitata* (G.Winter) Cummins Y.Hirats. occurred on 15.7% of *Acacia auriculiformis* trees in a plantation in South Sumatra (Zulfiyah and Gales 1997). Other rust diseases such as *Ravenelia* sp. and *Uromycladium tepperianum* (Sacc.) McAlpine may cause significant disease of foliage.

Valsa eugeniae Nutman & Roberts has caused a gummosis of *Terminalia brassii* in the Solomon Islands but it appears to have little effect on growth and is not considered to be serious (Chaplin 1993).

Species such as *Botryosphaeria rhodina* (Berk. & M.A.Curtis) Arx [anamorph *Botryodiplodia theobromae* Pat. syn. *Lasiodiplodia theobromae* (Pat.) Griffon & Maubl.] and *Botryosphaeria ribis* Grossenb. & Duggar [anamorph Fusicoccum sp.] and *Phoma* spp. are often associated with canker/dieback diseases of a wide range of tree species.

Pestalotia and *Pestalotiopsis* species may be saprophytic, but some are often associated with foliage or shoot diseases.

References

Barnard, J.E., Radloff, D.L., Loomis, R.C. and Space, J.C. (1992). Forest health monitoring: taking the pulse of America's forests. *In*: Wood, G. and Turner, B. (eds) *Integrating Forest Information Over Space and Time*. IUFRO Conference, 13-17 January, 1992, Canberra, Australia, pp. 343-348.

Beaver, R.A. (1976). The biology of Samoan bark and ambrosia beetles (Coleoptera, Scolytidae and Platypodidae). *Bulletin of Entomological Research*, 65: 531-548.

Bigger, M. (1988). The insect pests of forest plantation trees in the Solomon Islands. *Solomon Islands' Forest Record* No. 4.

Brown, B.N. (1980). Report of disease survey of Norfolk Island pine on Norfolk Island. *In*. Pest and Disease Survey of Norfolk Island. Plant Quarantine Branch, Commonwealth Department of Health, Canberra, pp. 1-15.

Brown, F.G. (1966). Some Platypodidae and Scolytidae (Coleoptera) from the Phillipine, Bismarck and Solomon Islands. *Entomoolgiske Meddelelser*, 34: 233-257.

Burrows, D.W., Balciunas, J.K. and Edwardsm E.D. (1996). Herbivorous insects associated with the paperbark *Melaleuca quinquenervia* and its allies: V. Pyralidae and other Lepidoptera. *Australian Entomologist 23, 7-16.*

Chaplin, G. (1993). Silvicultural Manual for the Solomon Islands. *Solomon Islands Forest Record* No. 6. ODA Forestry Series No. 1. Overseas Development Administration, London, UK. 305 pp.

Dingley, J.M., Fullerton, R.A. and McKenzie, E.H.C. (1981). *Survey of Agricultural pests and diseases Technical Report* Volume 2: Records of Fungi, Bacteria, Algae, and Angiosperms pathogenic on plants in Cook Islands ,Fiji, Kiribati, Niue, Tonga, Tuvalu and Western Samoa. South Pacific Bureau for Economic Co-operation UN FAO. 485 pp

Elliott, H.J., Ohmart, C.P. and Wylie, F.R. (1998). *Insect Pests of Australian Forests: Ecology and Management*. Inkata Press: Melbourne. 214pp.

Ellis, M.B. (1971). *Dematiaceous Hyphomycetes.* Commonwealth Mycological Institute: Kew, England. 608 pp.

Gibson, I.A.S. (1975). *Diseases of Forest Trees Widely Planted as Exotics in the Tropics and Southern Hemisphere. Part 1. Important Members of the Myrtaceae, Leguminosae, Verbenaceae and Meliaceae*. Commonwealth Mycological Institute: Kew, Surrey and Commonwealth Forestry Institute: Oxford. 51 pp.

Gibson, I.A.S. (1979). *Diseases of Forest Trees Widely Planted as Exotics in the Tropics and Southern Hemisphere. II. The Genus Pinus.* Commonwealth Mycological Institute: Kew, Surrey and Commonwealth Forestry Institute: Oxford. 135 pp.

Gray, B. (1974). Forest insect problems in the South Pacific islands. *Commonwealth Forestry Review*, 53: 39-115.

Gray, B. and Butcher, J. (1969). Termite eradication in *Araucaria* plantations in Papua New Guinea. *Commonwealth Forestry Review* 48, 201-207.

Hayward, A.C. (1986). Bacterial wilt caused by *Pseudomonas solanacearum* in Asia and Australia: an overview. *In* Persley, G.J., (editor), Bacterial Wilt Disease in Asia and the South Pacific. Proceedings of an International workshop held at PCARRD, Los Baños, Philippines, 8-10 October 1985, :15-24.

Hood, I.A. (1979). The significance of a *Ganoderma* species in second rotation stands of *Pinus caribaea* on grassland areas of Fiji. Report 2: Field work and establishment of trials in Viti Levu, October-November 1979. Forest Research Institute, Rotorua, New Zealand. 26 + pp.

Hood, I.A. and Bell, T.I.W. (1983). Inoculation of *Pinus caribaea* var. *hondurensis* seedlings with *Ganoderma lucidum* in Fiji. *New Zealand Journal of Foresty Science* 13(1), 53-57.

Ivory, M.H. (1987). *Diseases and Disorders of Pines in the Tropics. A Field and Laboratory Manual*. Overseas Research Publication Series No. 31. Overseas Development Administration, Oxford Forestry Institute: Oxford, England. 92 pp.

Ivory, M.H. (1989a). Fungus collections from West Asia, the East Indies and some Pacific Islands. *Proceedings of the Regional Symposium on recent developments in tree plantations of humid/sub-humid tropics of Asia*. Universiti Pertanian Malaysia, 5-9th June 1981.

Ivory, M.H. (1989b). Brown root-rot of forest trees in the S.W. Pacific. *Proceedings of the 7th IUFRO International Conference on Root and Butt Rots, Vernon and Victoria, British Columbia, 1988*. (Ed. D.J. Morrison) pp. 612-614. (Forestry Canada: Victoria, British Colombia.).

Ivory, M.H. (1990). Brown root-rot of tropical forest trees in the South-west Pacific Region. *Proceedings of the IUFRO Workshop on Pests and Diseases in Forest Plantations*. RAPA Publication:1990/9. (Eds. C. Hutacharern, K.G. MacDicken, M.H. Ivory and K.S.S. Nair).

Ivory, M.H. (1992?). Inoculation of tropical trees with *Phellinus noxius*. *Proceedings of the 3rd International Conference on Plant Protection in the Tropics*. Malaysian Plant Protection Society. Genting Higlands, Pahang, Malaysia, March 20-23 1990. Volume 4, pp. 164-170.

Ivory, M.H. (1996). Diseases of forest trees caused by the pathogen *Phellinus noxius*. *Forest Trees and Palms. Disease Control.* (Eds S.P. Raychaudhuri and M. Maramorosch): Oxford and IHB Publishing: New Delhi, Calcutta, pp.111-133.

Ivory, M.H. and Daruhi, G. (1993a). New host records for *Phellinus noxius* in Vanuatu. *FAO Plant Protection Bulletin* 41(1): 37-38.

Ivory, M.H. and Daruhi, G. (1993b). New host records for *Rigidoporus vinctus* and *Phanerochaete salmonicolor* in Vanuatu. *FAO Plant Protection Bulletin* 41(1): 38.

Ivory, M.H. and Speight, M.R. (1993). Pest Management. Chapter 18. *Tropical Forestry Handbook Volume 2* (Ed. Laslo Pancel). Springer-Verlag: Berlin, pp. 1141-1219.

Ivory, M.H., Daruhi, G. and Dick, A.M.P.(1993). New leaf diseases of forest trees recorded in Vanuatu.. *FAO Plant Protection Bulletin* 41(1): 38-39.

Ivory, M.H., Daruhi, G. and Tungon, J.(1992). The origin and development of brown root-rot of Salmwood [*Cordia alliodora* (Ruiz. & Pav.) Cham.] caused by *Phellinus noxius* (Corner).

Jhala, R.C., Pater, Z.P. and Shah, A.H. (1988). Pests of milk tree (*Manilkara hexandra*), a rootstock for sapodilla (*Manilkara achras*). *Indian Journal of Agricultural Sciences* 58: 730-731.

Mahew, J.E. and Newton, A.C. (1998). *The Silviculture of Mahogany*. CABI Publishing: Wallingford, Oxon, UK. 226 pp.

McKenzie, E.H.C. (1989). *The fungi, bacteria and pathogenic algae of Vanuatu*. Plant Diseases Division, DSIR, Auckland, New Zealand. 91 pp.

McKenzie, E.H.C. (1996). *The Fungi, bacteria and pathogenic algae on plants in American Samoa*. Technical Paper (South Pacific Commission) No. 206, 78 pp.

Mercer, C.W.L. (1990). Prospects for integrated pest management in Forestry in Papua New Guinea. *Brighton Crop Protection Conference, Pests and Diseases*, Vol. 1, pp. 385-390.

Merrifield, L.E. and Howcroft, N.H.S. (1975). *Ceroplastes rubens* Maskell damage of *Pinus caribaea* Morelet with notes on the scale's preference of certain clones of host material (Hemiptera: Coccidae). *Silvae Genetica* 24: 110-113.

Nag Raj, T.R. (1993). *Coelomycetous anamorphs with appendage-bearing conidia*. Mycologue Publications: Waterloo, Ontario, Canada. 1101 pp.

Neil, P.E. (1986a). A preliminary report of *Phellinus noxius* root rot of *Cordia alliodora* plantings in Vanuatu. *European Journal of Forest Pathology* 16(5-6): 274-280.

Neil, P.E. (1986b). *Swietenia macrophylla* (Mahogany) in Vanuatu. Government of Vanuatu, Forest Research Report 4/86. 8 + pp.

Neil, P.E. (1988). Root disease of *Cordia alliodora* in Vanuatu. *The Commonwealth Forestry Review* 67(4): 363-372.

Newton, A.C., P., Ramnarine, S., Mesen, J.F. and Leakey, R.R.B. (1993). The mahogany shoot borer: prospects for control. *Forest Ecology and Management* 57: 301-328.

Roberts, H. (1987). DPI Entomology Bulletin: No. 45. Forest insect pests of Papua New Guinea 1. Under-bark borers of kamarere and Terminalia – Agrilus beetles. *Harvest* 12(2): 59-64.

Roberts. H. (1977). When ambrosia beetles attack mahogany trees in Fiji. *UNASYLVA* vol. 29: 25-28.

Silwal, B. and Mehta, J.N. (1992). Assessment of training needs for effective Forest User Group Committee development: a case study of Kaski District. *Banko janakari* 3: 47-50.

Speight, M.R., and Wylie F.R. (2001). *Insect pests in tropical forestry*. CABI: Wallingford. 307pp.

Sujan Singh and Irami Bola. (1981). Diseases of plantation trees in Fiji Islands. II. *Clitocybe* root-rot of mahogany (*Swietenia macrophylla* King) and *Pinus elliottii* Engelm. *Indian Journal of Forestry* 4(2): 86-91.

Sujan Singh, Irami Bola, and Kumar, J. (1980). Diseases of plantation trees in Fiji Islands. I. Brown root rot of mahogany (*Swietenia macrophylla* King). *The Indian Forester* 106(8): 525-532.

Sutton, B.C. (1980a). *The Coelomycetes. Fungi Imperfecti with Pycnidia, Acervuli and Stromata*. Commonwealth Mycological Institute: Kew. 696 pp.

Sutton, B.C. and Ganapathi, A. (1978). *Trimmatostroma excentricum* sp. nov. on *Eucalyptus* from New Zealand and Fiji. *New Zealand Journal of Botany* 16: 529-533.

Wood, S.L. (1982). The bark and ambrosia beetles of North and central America (Coleoptera: Scolytidae), a taxonomic monograph. *Great Basin Naturalist Memoirs* No. 6.

Wylie, F.R., Peters, B., De Baar, M., King, J. and Fitzgerald, C. (1999). Managing attack by bark and ambrosia beetles (Coleoptera: Scolytidae) in fire-damaged *Pinus* plantations and salvaged logs in Queensland, Australia. *Australian Forestry* 62, 148-153.

Yates, H.O. (1972). Bark beetles attacking Caribbean pine in northeastern Nicaragua. *FAO Plant Protection Bulletin* 20: 25-27

Appendix 1. Known arthropod pests of plantation forests in the southern and western Pacific

Extracted from Waterhouse D.F. (1997) The Major Invertebrate Pests and Weeds of Agriculture and Plantation Forestry in the Southern and Western Pacific. ACIAR, Canberra.

Scientific name	Order	Family	English common name	Principal trees attacked
Acalolepta spp.	Coleoptera	Cerambycidae	longhorn beetles	many species
Acrocerops sp.	Lepidoptera	Gracillariidea		*Terminalia catappa*
Adoxoyphes aurantiana Bradley	Lepidoptera	Tortricidae		*Terminalia, Campnosperma, Calophyllum, Acacia, Albizia*
Adoxoyphes fasciculana (Walker)	Lepidoptera	Tortricidae		*Araucaria cunninghamii*
Agathiphaga vitiensis Dumbleton	Lepidoptera	Agathiphagidae		*Agathis macrophylla, A.obtusa, A.vitiensis*
Agrilus opulentus Kerremans	Coleoptera	Buprestidae	varicose borer	*Eucalyptus deglupta*
Agrilus viridissimus Cobos	Coleoptera	Buprestidae		*Terminalia brassii*
Amblypelta cocophaga China	Hemiptera	Coreidae	coconut bug	*Eucalyptus deglupta, Campnosperma brevipetiolata, coconut*
Aonideiella eremocitri McKenzie	Hemiptera	Diaspididae		*Campnosperma brevipetiolata, Barringtonia*
Arispoda sp.	Coleoptera	Chrysomelidae		*Tectona grandis*
Ascalenia sp.	Lepidoptera	Cosmopterigidae		*Albizia, Pometia*
Aspidiotus destructor (Signoret)	Hemiptera	Diaspididae	coconut scale, transparent scale	coconut, *Barringtonia, Calophyllum*
Asterolecanium sp.	Hemiptera	Asterolecannidae		*Cordia subcordata*
Asterolepis glycera (Meyrick)	Lepidoptera	Tortricidae		*Terminalia*
Asymplecta phobiophora Diakonoff	Lepidoptera	Lyonettiidae		*Campnosperma, Ochroma lagopus, Terminalia*
Badamia exclamationis (Fabricius)	Lepidoptera	Hesperiidae	brown awl	*Terminalia calamansanai, T.catappa, T.brassii*
Ceroplastes rubens Maskell	Hemiptera	Coccidae	pink wax scale	*Pinus caribaea, Barringtonia*
Chrysomphalus aonidum (Linnaeus)	Hemiptera	Diaspididae	cicular black scale	*Pinus caribaea*
Chrysomphalus dictyospermi Morgan	Hemiptera	Diaspididae	dictyospera scale	*Pinus, Calophyllum, Terminalia, Barringtonia*
Coccus hesperidum Linnaeus	Hemiptera	Coccidae	soft brown scale	*Eucalyptus,Cordia, Casuarina, Pinus, Terminalia, Pometia*

Scientific name	**Order**	**Family**	**English common name**	**Principal trees attacked**
Coptotermes elisae (Desnaux)	Isoptera	Rhinotermitidae		*Araucaria cunninghamii, A.hunsteinii*
Crossotarsus extemedentatus (Fairmaire)	Coleoptera	Platypodidae		*Swietenia, Cordia, Terminalia, Eucalyptus, etc.*
Cyphura bifasciata (Butler)	Lepidoptera	Uraniidae		*Endospermum*
Diotimana undulata (Pascoe)	Coleoptera	Cerambycidae	hoop-pine longicorn	*Araucaria cunninghamii*
Eriophyes casuarina Channabasavanna	(Acari)	Eriophyiidae		*Casuarina equisetifolia*
Eriophyes terminaliae Channabasavanna	(Acari)	Eriophyiidae		*Terminalia catappa*
Eucerocoris sp.	Hemiptera	Miridae		*Campnosperma*
Fabrictilis australis (Fabricius)	Hemiptera	Coreidae		*Araucaria, Eucalyptus, Tectona*
Fabrictilis gonagra (Fabricius)	Hemiptera	Coreidae	passionvine bug	*Tectona grandis*
Gryllotalpa africana Beauvios	Orthoptera	Gryllotalpidae		*Tectona grandis*
Homona coffearia (Nietner)	Lepidoptera	Tortricidae	tea tortrix, coffee tortrix	*Acacia, Araucaria, Terminalia*
Hyblaea puera (Cramer)	Lepidoptera	Hyblaeidae	teak moth	*Tectona grandis, Spathodae*
Hyblaea sanguinea Gaede	Lepidoptera	Hyblaeidae		*Tectona grandis, Vitex*
Hylurdrectonus araucariae Schedl	Coleoptera	Scolytidae		*Araucaria cunninghamii*
Hylurdrectonus piniarius Schedl	Coleoptera	Scolytidae	hoop-pine bak beetle	*Araucaria cunninghamii*
Hypothenemus birmanus (Eichhoff)	Coleoptera	Scolytidae	kiae scolytid	*Swietenia, Agathis, Casuarina*
Hypothenemus eruditus (Westwood)	Coleoptera	Scolytidae		*Swietenia, Tectona, Pterocarpus*
Hypsipyla robusta (Moore)	Lepidoptera	Pyralidae	cedar shoot caterpillar	*Swietenia, Toona, Cedrela*

Scientific name	Order	Family	English common name	Principal trees attacked
Icerya purchasi Maskell	Hemiptera	Margarodidae	cottony cushion scale	*Casuarina equisetifolia, Pinus caribaea*
Icerya seychellarum (Westwood)	Hemiptera	Margarodidae	Seyechelles mealybug	*Ficus, Albizia, Calphyllum, Tectona*
Ips sp.	Coleoptera	Scolytidae		
Leptynoptera sulfurea Crawford	Hemiptera	Psyllidae		*Calophyllum inophyllum*
Lymantria flavoneura Joicey	Lepidoptera	Lymantriidae		*Pinus patula*
Lymantria ninayi Bethune-Baker	Lepidoptera	Lymantriidae		*Pinus patula, P.radiata*
Microcerotermes biroi (Desneaux)	Isoptera	Termitidae		*Eucalyptus deglupta, Araucaria*
Mictis profana (Fabricius)	Hemiptera	Coreidae	crusader bug	*Acacia aulacocarpa*
Milionia isodoxa Prout	Lepidoptera	Geometridae		*Araucaria cunninghamii*
Mussidia pectinicomela Hampson	Lepidoptera	Pyralidae		*Eucalyptus grandis*
Naustitermes novarum-hebridarum (Holmgren & Holgrem)	Isoptera	Termitidae		*Eucalyptus deglupta, Tectona, Acacia mangium*
Neotermes sp.	Isoptera	Kalotermitidae		*Calophyllum, Garcinia, Gonostylus, Heritiera, Myristica, Palaquium, Swietenia*
Oceanaspidiotus araucariae (Adachi & Fulaway)	Hemiptera	Diaspididae		*Araucaria cookii*
Ophiusa coronata (Fabricius)	Lepidoptera	Noctuidae		*Terminalia*
Oribius destructor Marshall	Coleoptera	Curculionidae		*Eucalyptus deglupta, Araucaria cunninghamii*
Oribius inimicus Marshall	Coleoptera	Curculionidae		*Eucalyptus deglupta, Araucaria, Pinus*
Orthotomicus erosus (Wollaston)	Coleoptera	Scolytidae		*Pinus*

Scientific name	Order	Family	English common name	Principal trees attacked
Oxymagis homi (Heller)	Coleoptera	Cerambycidae		*Eucalyptus deglupta, Terminalia calamansanai, Albizia, Gmelina, etc.*
Pachypeltis sp.	Hemiptera	Miridae		*Terminalia*
Pantorhytes sp.	Coleoptera	Curculionidae		*Ochroma lagopus*
Paratella errudita Melichar	Hemiptera	Flatidae		*Eucalyptus deglupta*
Parectopa sp.	Lepidoptera	Gracillariidea		*Terminalia catappa*
Phytorus lineolatus Weise	Coleoptera	Chrysomelidae		*Calophyllum inophyllum*
Pinnaspis aspidistrae (Signoret)	Hemiptera	Diaspididae	fern scale	*Anacardium occidentale, Terminalia catappa*
Pinnaspis strachani (Cooley)	Hemiptera	Diaspididae		*Terminalia*, coconut
Planococcus lilacinus (Cockerell)	Hemiptera	Pseudococcidae	coffee mealybug	*Terminalia catappa*
Platypus gerstaeckeri Chapuis	Coleoptera	Platypodidae		*Swietenia macrophylla, Agathis, Calaphyllum, Endospermum, Garcinia, Gonostylus, Heritiera, Myristica, Palaquium, etc.*
Platypus jansoni Chapuis	Coleoptera	Platypodidae		*Agathis, Araucaria*
Pternistria levipes Horvàth	Hemiptera	Coreidae		*Tectona grandis*
Pternistria macromera Guerin	Hemiptera	Coreidae		*Tectona grandis*
Ptochophyle innotata Warren	Lepidoptera	Geometridae		*Terminalia calamansanai*
Ptochophyle strigata Warren	Lepidoptera	Geometridae		*Terminalia brassii*
Rhyparida coriacea Jacoby	Coleoptera	Chrysomelidae		*Eucalyptus deglupta*
Saissetia coffeae (Walker)	Hemiptera	Coccidae	coffee scale	*Barringtonia*
Saissetia oleae (Oliver)	Hemiptera	Coccidae	black scale	*Erythrina*

Scientific name	Order	Family	English common name	Principal trees attacked
Selenothrips rubrocinctus Giard	Thysanoptera	Thripidae	redbanded thrips	*Terminalia catappa*
Semiothisa abydata (Guenée)	Lepidoptera	Geometridae		*Albizia, Pometia*
Syllepte derogata (Fabricius)	Lepidoptera	Pyralidae		*Campnosperma brevipetiolata, Ochroma lagopus*
Trigonops sp.	Coleoptera	Curculionidae		*Terminalia, Gmelina, Swietenia, Horsfieldia*
Trigonops inusitata Zimmerman	Coleoptera	Curculionidae		*Calophyllum inophyllum*
Trigonops valgaris Zimmerman	Coleoptera	Curculionidae		*Terminalia catappa*
Unaspis citri (Comstock)	Hemiptera	Diaspididae	white louse scale, citrus snow scale	*Toona australis*
Uraba (=Roeselia) lignifera (Walker)	Lepidoptera	Nolidae		*Terminalia*
Urapteroides astheniata (Guenée)	Lepidoptera	Uraniidae		*Endospermum*
Vanapa oberthuri Pouillaude	Coleoptera	Curculionidae		*Arucaria cunninghamii*
Wasmannia auropunctata (Roger)	Hymenoptera	Formicidae	little red fire ant	(protects scale insects)
Westermannia gloriosa Hampson	Lepidoptera	Noctuidae		*Terminalia*
Xyleborus ferrugineus (Fabricius)	Coleoptera	Scolytidae		*Swietenia, Agathis, Endospermum, Garcinia, Heritiera, Myristica, Palaquium, Pinus*
Xyleborus perforans (Wollaston)	Coleoptera	Scolytidae	island pinhole borer	*Agathis, Calophyllum, Endospermum, Garcinia, Myristica, Palaquium, Pinus, Campnosperma, Terminalia, Cedrela, Eucalyptus, Pometia, etc.*
Xyleborus volvulus (=X.torquatus) (Fabricius)	Coleoptera	Scolytidae		*Swietenia, Pinus, Cedrela, Cordia*
Xyleutes ceramicus (Walker)	Lepidoptera	Cossidae	teak beehole borer	*Gmelina, Tectona*
Xylosandrus compactus (Eichhoff)	Coleoptera	Scolytidae	black twig borer	*Pometia, Melia, Swietenia, Pinus*
Xylosandrus morigerus (Blandford)	Coleoptera	Scolytidae	brown twig borer	*Swietenia*
Xylotrupes gideon (Linnaeus)	Coleoptera	Scarabaeidae	elephant beetle	*Eucalyptus, Toona, Fraxinus*
Zeuzera coffeae Nietner	Lepidoptera	Cossidae	red coffee borer	*Eucalyptus deglupta, Albizia, Casuarina, Swietenia, Tectona, Terminalia*

Appendix 2. Microorganisms recorded on forest plantation trees and their close relatives in the south western Pacific area.

Pathogen	Order	Host	Country	References
Aecidium fragiforme Ces.		*Agathis dammara* (Lamb.) Rich. & A.Rich., *Agathis macrophylla* (Lindl.) Mast., *Agathis vitiensis* (Seem.) Benth. & Hook.f.	Fiji, Santa Cruz, Vanuatu	Chaplin 1993, Dingley et al. 1981, McKenzie 1989
Aithaloderma clavatisporium Syd. & P.Syd.	Dothidiales	*Calophyllum inophyllum* L.	Kiribati	Dingley et al. 1981
Allescheriella crocea (Mont.) S.Hughes		*Gmelina* sp.	New Caledonia	Ellis 1971
Alternaria sp.		*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Armillaria mellea (Vahl:Fr.) P.Kumm. [anamorph *Rhizomorpha subcorticicalis* Pers.]	Agaricales	*Cordia alliodora* (Ruiz & Pav.) Oken, *Pinus elliottii* Engelm., *Pinus taeda* L., *Swietenia macrophylla* King	Fiji, Vanuatu	Dingley et al. 1981, Gibson 1975, Mahew and Newton 1998, McKenzie 1989
Armillaria spp.	Agaricales	*Anthocephalus chinensis* (Lam.) A.Rich ex Walp., *Pinus caribaea* Morelet, *Pinus elliottii* Engelm., *Pinus* spp., *Swietenia macrophylla* King, *Swietenia mahagoni* (L.) Jacq.	Fiji	Ivory 1987, Ivory 1989a, Ivory 1990
Armillaria tabescens (Scop.) Emel [syn. *Clitocybe tabescens* (Scop.) Bres.]	Agaricales	*Agathis vitiensis* (Seem.) Benth. & Hook.f., *Calophyllum vitiense* Turr., *Endospermum macrophyllum* (Mull.-Arg.) Pax & K.Hoff, *Garcinia myrtifolia* A.C.Sm., *Gonostylus punctatus* A.C.Sm., *Heritiera ornithocephala*, *Myristica castaneifolia* A.Gray, *Palaquin hornei* (Hartog ex Bak.) Dubard, *Pinus elliottii* Engelm., *Swietenia macrophylla* King	Fiji	Neil 1986b, Sujan Singh and Irami Bola 1981
Asteridiella knemae (Hansf.) Hansf.	Meliolales	*Myristica fragrans* Houtt.	Fiji	Dingley et al. 1981
Asteridiella phyllanthi (Deighton) Hansf.	Meliolales	*Securingea flexuosa* Muell.-Arg. [syn. *Securinega samoana* Corizat]	Western Samoa	Dingley et al. 1981
Asterina sp.	Dothideales	*Dracontomelon vitiense* K. Schum.	Vanuatu	
Atelocauda digitata (G.Winter) Cummins Y.Hirats. [syn. *Uromyces digitatus* Halst.]	Uredinales	*Acacia spirorbis* Labill., *Acacia* sp.	New Caledonia , Vanuatu	Gibson 1975, McKenzie 1989
Auricularia polytricha (Mont.) Sacc.	Auriculariales	*Cordia alliodora* (Ruiz & Pav.) Oken	Vanuatu	McKenzie 1989

Pathogen	Order	Host	Country	References
Botryosphaeria berengeriana De Not. var. *araucariae* [anamorph *Dothiorella araucariae*]	Dothidales	*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Botryosphaeria rhodina (Berk. & M.A.Curtis) Arx [anamorph *Botryodiplodia theobromae* Pat. syn. *Lasiodiplodia theobromae* (Pat.) Griffon & Maubl.]	Dothidales	*Araucaria heterophylla* (Salisb.) Franco, *Cedrella odorata* L., *Swietenia macrophylla* King	Fiji, Norfolk Island, Solomon Islands	Brown 1989, Dingley et al. 1981, Gibson 1975
Botryosphaeria ribis Grossenb. & Duggar [anamorph *Fusicoccum* sp.]	Dothidales	*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Brachysporiella gayana Bat.		*Eucalyptus* sp.		McKenzie 1996
Calonectria quinqueseptata Figueiredo & Namek. [anamorph *Cylindrocladium quinqueseptatum* Boedijn & Reitsma]	Hypocreales	*Eucalyptus grandis* W.Hill, *Eucalyptus urophylla* S.T.Blake	Vanuatu	Ivory et al. 1993
Ceratobasidium sp.	Ceratobasidales	*Swietenia macrophylla* King	Fiji	Dingley et al. 1981
Ceratostomella sp.	Xylariales	*Endospermum macrophyllum* (Mull.-Arg.) Pax & K.Hoff	Fiji	Dingley et al. 1981
Cercospora agharkarii Chidd.		*Grevillea robusta* A.Cunn.	Tonga	Dingley et al. 1981
Cercospora catappae Henn.		*Terminalia catappa* L.; *Terminalia littoralis* Seem.	Federated States of Micronesia, Fiji, Guam, Western Samoa	Dingley et al. 1981, McKenzie 1996
Cercospora sp.		*Pinus caribaea* Morelet	Fiji	Dingley et al. 1981
Ceuthospora garciniae Syd.		Garcinia sp.	Indonesia	Nag Raj 1993
Cladosporium oxysporum Berk. & M.A.Curtis		*Pinus caribaea* Morelet	Fiji	Dingley et al. 1981
Colletotrichum sp.		*Araucaria heterophylla* (Salisb.) Franco, *Swietenia macrophylla* King	Fiji, Norfolk Island	Brown 1989, Dingley et al. 1981
Corticium koleroga (Cooke) Höhn.	Stereales	*Swietenia macrophylla* King	Fiji	Mahew and Newton 1998

Pathogen	Order	Host	Country	References
Corticium salmonicolor Berk. & Broome [anamorph *Necator decretus* Massee] [syn. *Phanerochaete salmonicolor* (Berk. & Broome) Jülich]	Stereales	*Agathis macrophylla* (Lindl.) Mast., *Cordia alliodora* (Ruiz & Pav.) Oken, *Swietenia macrophylla* King	Fiji, Solomon Islands, Vanuatu	Chaplin 1993, Dingley et al. 1981, Ivory 1989a; Ivory and Daruhi 1993b; Ivory and Speight 1993
Coryneum calophylli (Syd.) Morgan-Jones		*Calophyllum inophyllum* L.	Philippines	Sutton 1980
Cryphonectria cubensis (Bruner) Hodges [syn. *Valsa eugeniae* Nutman & Roberts]	Diaporthales	*Terminalia littoralis* Exell.	Solomon Islands	Chaplin 1993
Cunninghamella sp.	Mucorales	*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Cyclomyces setiporus (Berk.) Pat.	Hymenochaetales	*Corymbia grandifolia* (R.Br. ex Benth.) K.D.Hill & L.A.S.Johnson [syn. *Eucalyptus grandifolia* R.Br. ex Benth.]	Niue	Dingley et al. 1981
Cylindrocladium tenue (Bugnic.) Ts.Watan. [syn. *Cylindrocarpon tenue* Bugnic.]		*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Didymosphaeria sp.	Dothideales	*Swietenia macrophylla* King	Fiji	Dingley et al. 1981
Discosia sp.		*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Dothiorella sp.		*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Eutypella sp.	Diatrypales	*Swietenia macrophylla* King	Fiji	Dingley et al. 1981
Fusarium oxysporum Schltdl.		*Pinus caribaea* Morelet	Fiji	Dingley et al. 1981
Fusarium spp.		*Araucaria heterophylla* (Salisb.) Franco, *Pinus caribaea* Morelet	Fiji, Norfolk Island	Brown 1989, Dingley et al. 1981
Ganoderma australe (Fr.) Pat. [syn. *Ganoderma tornatum* (Pers.) Bres.]	Ganodermatales	*Grevillea robusta* A.Cunn.	Fiji, Tonga	Dingley et al. 1981, Ivory 1989a
Ganoderma lucidum (Curtis) P.Karst. sens lat.	Ganodermatales	*Agathis vitiensis* (Seem.) Benth. & Hook.f., *Pinus caribaea* Morelet	Fiji	Hood 1979, Hood and Bell 1983
Glomerella cingulata (Stoneman) Spauld. & H.Schrenk [anamorph *Colletotrichum gloeosporioides* (Penz.) Penz. & Sacc.]	Phyllachorales	*Pinus caribaea* Morelet, *Pinus* spp., *Terminalia catappa* L.	Fiji, Niue	Dingley et al. 1981, Gibson 1979
Gnomonia sp.	Diaporthales	*Terminalia catappa* L.	Vanuatu	McKenzie 1989

Pathogen	Order	Host	Country	References
Guignardia pini Sivan. [anamorph *Phyllosticta* sp.]	Dothidales	*Agathis macrophylla* (Lindl.) Mast.	Vanuatu	Ivory et al. 1993
Guignardia sp.	Dothidales	*Calophyllum* sp., *Eucalyptus* spp.	Solomon Islands, Vanuatu	Gibson 1975, Ivory et al. 1993
Henicospora coronata B.Sutton & P.M.Kirk		*Eucalyptus* sp.	New Caledonia	McKenzie 1996
Heterobasidion annosum (Fr.:Fr.) Bref. [anamorph *Oedocephalum lineatum* B.K.Bakshi]	Poriales	*Agathis macrophylla* (Lindl.) Mast., *Agathis vitiensis* (Seem.) Benth. & Hook.f., *Araucaria cunninghamii* A.Cunn., *Pinus* spp.	Fiji	Dingley et al. 1981, Ivory 1987, Ivory 1989a
Hymenochaete attenuata Lév.	Hymenochaetales	*Swietenia macrophylla* King	Fiji	Dingley et al. 1981
Hypoxylon stygium (Lév.) Sacc.	Xylariales	*Maesopsis eminii* Engl.	Fiji	Ivory 1989a
Lenzites elegans (Fr.) Pat. [syn. *Lenzites repanda* (Mont.) Fr.]	Poriales	*Terminalia richii* A.Gray	Western Samoa	Dingley et al. 1981
Leptostroma sp.		*Pinus caribaea* Morelet, *Pinus elliottii* Engelm., *Pinus insularis* Endl., *Pinus patula* Schlechtend. & Cham., *Pinus strobus* L., *Pinus taeda* L.	Fiji	Dingley et al. 1981
Leptothyrium pinastri P.Karst.		*Pinus* spp.	Fiji	Dingley et al. 1981
Lophodermium australe Dearn. [anamorph *Leptostroma durissimum* Cooke]	Rhytismatales	*Pinus caribaea* Morelet, *Pinus elliottii* Engelm., *Pinus insularis* Endl., *Pinus patula* Schlechtend. & Cham., *Pinus strobus* L., *Pinus taeda* L., *Pinus* spp.	Fiji	Dingley et al. 1981, Gibson 1979
Lophodermium pinastri (Schrad.) Chevall.	Rhytismatales	*Pinus* spp.	Fiji	Gibson 1979
Lophodermium sp.	Rhytismatales	*Pinus elliottii* Engelm.	Fiji	Dingley et al. 1981
Macrophoma araucariae Delacr.		*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Macrophoma sp.		*Calophyllum inophyllum* L.	Vanuatu	McKenzie 1989
Macrophomina phaseolina (Tassi) Goid. [syn. *Macrophomina phaseoli* (Maubl.) Ashby]		*Araucaria heterophylla* (Salisb.) Franco, *Pinus caribaea* Morelet	Fiji, Norfolk Island, Solomon Islands	Brown 1989, Dingley et al. 1981, Gibson 1979
Meliola sp.	Meliolales	*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Mycosphaerella nubilosa (Cooke) Hansf.	Dothidales	*Eucalyptus deglupta* Blume	Vanuatu	Ivory et al. 1993
Mytilidion sp.	Dothidales	*Agathis robusta* (F.Muell.) F.M.Bailey	Fiji	Dingley et al. 1981

Pathogen	Order	Host	Country	References
Nattrassia mangiferae (Syd. & P.Syd.) B.Sutton & Dyko [syn. *Hendersonula agathi* H.E.Young]		*Agathis robusta* (F.Muell.) F.M.Bailey	Fiji	Dingley et al. 1981
Nectria haematococca Berk. & Broome [anamorph *Fusarium solani* (Mart.) Sacc.]	Hypocreales	*Pinus caribaea* Morelet	Fiji	Dingley et al. 1981
Nigrospora sp.		*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Oidium sp.		*Acacia spirorbis* Labill.	Vanuatu	McKenzie 1989
Pellicularia sp.		*Swietenia macrophylla* King	Fiji	Mahew and Newton 1998
Penicillium sp.		*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Pestalotia sp.		*Garcinia* sp.	Fiji	Dingley et al. 1981
Pestalotiopsis calabae (Westend.) Steyaert		*Calophyllum inophyllum* L., *Calophyllum* sp.	Kiribati, Tonga	Dingley et al. 1981
Pestalotiopsis conigena (Lév.) G.C.Zhao & N.Li [syn. *Pestalotia conigena* Lév.]		*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Pestalotiopsis foedans (Sacc. & Ellis) Steyaert		*Agathis robusta* (F.Muell.) F.M.Bailey	Fiji	Dingley et al. 1981
Pestalotiopsis microspora (Speg.) G.C.Zhao & N.Li [*Pestalotia dichaeta* Speg.]		*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Pestalotiopsis spp.		*Pinus caribaea* Morelet, *Pinus* spp., *Swietenia macrophylla* King	Fiji	Dingley et al. 1981, Ivory 1989a
Peziza repanda P.Karst.	Pezizales	*Cordia alliodora* (Ruiz & Pav.) Oken	Vanuatu	McKenzie 1989
Phellinus gilvus (Schwein.) Pat.	Hymenochaetales	*Terminalia ivorensis* A. Cheval.	Fiji	Ivory 1989a

Phellinus noxius (Corner) G.Cunn. [syn. *Fomes noxius* Corner]	Hymenochaetales	*Acacia aulacocarpa* A.Cunn. ex Benth., *Acacia crassicarpa* A.Cunn. ex Benth., *Acacia decurrens* Willd., *Acacia mangium* Willd., *Acacia mearnsii* De Wild., *Agathis macrophylla* (Lindl.) Mast., *Agathis ovata* (C.Moore ex Gord.) Warb., *Agathis palmerstonii* F.M.Bailey, *Agathis* sp., *Anthocephalus chinensis* (Lam.) A.Rich ex Walp., *Araucaria bidwillii* Hook., *Araucaria columnaris* Hook., *Araucaria cunninghamii* A.Cunn., *Araucaria heterophylla* (Salisb.) Franco [syn. *Araucaria excelsa* W.T.Aiton], *Araucaria hunsteinii* K.Schum., *Calophyllum neoebudicum, Calophyllum vitiense* Turr., *Campnosperma brevipetiolata* Volkens, *Cedrella odorata* L. [syn. *Cedrella mexicana* M.Roemer] *Cordia alliodora* (Ruiz & Pav.) Oken, *Endospermum macrophyllum* (Mull.-Arg.) Pax & K.Hoff, *Endospermum medullosum* L.S.Sm., *Corymbia citriodora* (Hook.) K.D.Hill & L.A.S.Johnson [syn.*Eucalyptus citriodora* Hook.], *Eucalyptus deglupta* Blume, *Eucalyptus drepanophylla* Benth., *Eucalyptus grandis* W.Hill, *Eucalyptus tereticornis* Sm., *Corymbia tessellaris* (F.Muell.) K.D.Hill & L.A.S.Johnson [syn. *Eucalyptus tessellaris* F.Muell.] *Eucalyptus urophylla* S.T.Blake, *Eucalyptus* sp., *Garcinia myrtifolia* A.C.Sm., *Garcinia pseudoguttifera, Garcinia* sp., *Gmelina arborea* Roxb., *Gonostylus punctatus* A.C.Sm., *Grevillea robusta* A.Cunn., *Heritiera ornithocephala*, *Leucaena leucocephala* (Lam.) de Wit, *Maesopsis eminii* Engl., *Melia azadarach* L., *Myristica castaneifolia* A.Gray, *Myristica falcata* Houtt., *Myristica falcata* Houtt. var. *papuana*, *Myristica fatua*, *Myristica fatua* var. *papuana*, *Myristica fragrans* Houtt., *Palaquium hornei*, *Pinus caribaea* Morelet, *Pinus elliottii* Engelm., *Pinus kesiya*, *Pinus merkusii, Pinus* spp., *Securinega flexuosa* Müll.Arg., *Securingea flexuosa* Muell.-Arg. [syn. *Securinega samoana* Corizat], *Swietenia macrophylla* King, *Swietenia mahagoni* (L.) Jacq., *Tectona grandis* L.f., *Terminalia brassii* Exell., *Terminalia calamansanai* (Blanco.) Rolfe, *Toona australis* (F.Muell.) Harms, *Toona ciliata*, *Triplochiton scleroxylon* K.Schumann	American Samoa , Federated States of Micronesia, Fiji, French Polynesia , Guam , Marshall Islands, New Caledonia, New Hebrides, Niue , Norfolk Island, Northern Marianas, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu, Wallis and Futuna, Western Samoa	Brown 1989, Chaplin 1993, Dingley et al. 1981, Gibson 1975, Ivory 1987, Ivory 1989a, Ivory 1989b, Ivory 1990, Ivory 1992?, Ivory 1996, Ivory and Daruhi 1993a, Ivory et al. 1992, Mahew and Newton 1998, McKenzie 1989, Neil 1986a, Neil 1986b, Neil 1988, Sujan Singh et al. 1980, Sujan Singh and Irami Bola 1981

Pathogen	Order	Host	Country	References
Phellorina inquinans Berk.	Tulostomatales	*Acacia richii* A.Gray	Fiji	
Phoma sp.		*Acacia spirorbis* Labill., *Araucaria heterophylla* (Salisb.) Franco	Norfolk Island , Vanuatu	Brown 1989, McKenzie 1989
Phoma tropica R.W.Schneid. & Boerema		*Cordia colococca* L.	Fiji, Tahiti	Sutton 1980
Phomopsis sp.		*Agathis* sp., *Araucaria heterophylla* (Salisb.) Franco	Norfolk Island , Santa Cruz	Brown 1989, Chaplin 1993
Phyllachora afzeliae Syd. & P.Syd.	Phyllachorales	*Intsia bijuga* (Colebr.) Kuntze	American and Western Samoa, Guam	McKenzie 1996
Phyllachora pterocarpi Syd. & P.Syd.	Phyllachorales	*Pterocarpus indicus* Willd.	Vanuatu	
Phyllosticta evernia (Syd.) Aa		*Garcinia livingstonii* T.Anderson, *Garcinia* sp.	Philippines	Nag Raj 1993
Phytophthora boehmeriae Sawada	Pythiales	*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Phytophthora drechsleri Tucker	Pythiales	*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Phytophthora meadii McRae	Pythiales	*Eucalyptus* spp.	Norfolk Island	Brown 1989
Pleurophragmium sp.		*Acacia spirorbis* Labill.	Vanuatu	McKenzie 1989
Pseudocercospora sp.		*Acacia spirorbis* Labill., Eucalyptus sp.	Vanuatu	McKenzie 1989
Pseudofavolus miquelii (Mont.) Pat.	Poriales	*Gmelina arborea* Roxb.	Fiji	Dingley et al. 1981
Pythium irregulare Buisman	Pythiales	*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Pythium paroecandrum Drechsler	Pythiales	*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Pythium sp.	Pythiales	*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Pythium vexans de Bary	Pythiales	*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Ralstonia solanacearum (Smith 1896) Yabuuchi, Kosako, Yano, Hotta & Nishiuchi 1995 [*Pseudomonas solanacearum* (Smith 1896) Smith 1914]		*Tectona grandis* L.	Philippines	Hayward 1986
Ravenelia sp.	Uredinales	*Acacia farnesiana* (L.) Willd., *Acacia* sp.	New Caledonia , Vanuatu	Gibson 1975, McKenzie 1989

Pathogen	Order	Host	Country	References
Ravenellia sessilis Berk.	Uredinales	Adenanthera pavonina L.	Niue, Western Samoa	Dingley et al. 1981, McKenzie 1996
Rhytidhysterium rufulum (Spreng.) Speg.	Patellariales	*Acacia spirorbis* Labill.	Vanuatu	McKenzie 1989
Rigidoporus lineatus (Pers.) Ryvarden	Poriales	*Cordia alliodora* (Ruiz & Pav.) Oken	Fiji , Solomon Islands, Vanuatu	Ivory 1989a
Rigidoporus microporus (Sw.) Overeem	Poriales		Fiji, Vanuatu	Ivory 1989a
Rigidoporus vinctus (Berk.) Ryvarden	Poriales	*Acacia mangium* Willd., *Cedrella odorata* L., *Gmelina arborea* Roxb., *Heritiera* sp.	Fiji, Solomon Islands, Vanuatu	McKenzie 1989 , Ivory 1989a, Ivory and Daruhi 1993b
Rosellinia sp.	Xylariales	*Calophyllum inophyllum* L.	Vanuatu	McKenzie 1989
Schizophyllum commune (L.) Fr.	Schizophyllales	*Pinus caribaea* Morelet	Fiji	Dingley et al. 1981
Scolecobasidium constrictum E.V.Abbott [syn. *Ochroconis constrictus* (E.V.Abbott) de Hoog & Arx]		*Cordia alliodora* (Ruiz & Pav.) Oken *, Gmelina* sp.	Vanuatu	McKenzie 1989
Servazziella longispora (Servazzi) J.Reid & C.Booth [syn *Cryptospora longispora* Servazzi)	Diaporthales	*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Seuratia millardetii (Racib.) Meeker (syn. *Atichia millardetii* Racib.)	Seutariaceae	*Calophyllum inophyllum* L.	Kiribati	Dingley et al. 1981
Sphaeropsis sapinea (Fr.) Dyko & B.Sutton		*Pinus* spp.	Fiji	Ivory 1989a
Thanatephorus cucumeris (A.B.Frank) Donk [anamorph *Rhizoctonia solani* J.G.Kühn]	Ceratobasidiales	*Swietenia macrophylla* King, *Swietenia mahagoni* (L.) Jacq.	Fiji	Dingley et al. 1981, Gibson 1975
Tinctoporellus epimiltinus (Berk. & Broome) Ryvarden	Poriales	*Acacia mangium* Willd., *Myristica* sp., *Swietenia macrophylla* King	Fiji, Solomon Islands	Ivory 1989a
Trametes cingulata Berk.	Poriales	*Araucaria cunninghamii* A.Cunn., *Maesopsis eminii* Engl., *Swietenia macrophylla* King	Fiji	Ivory 1989a
Trametes hirsuta (Wulfen:Fr.) Lloyd	Poriales	*Gmelina arborea* Roxb.	Fiji	Dingley et al. 1981
Trametes lactinea (Berk.) Pat.	Poriales	*Terminalia richii* A.Gray	Western Samoa	Dingley et al. 1981

Pathogen	Order	Host	Country	References
Trichoderma sp.		*Araucaria heterophylla* (Salisb.) Franco	Norfolk Island	Brown 1989
Trimmatostroma excentricum B.Sutton & Ganap.		*Eucalyptus* sp.	Fiji	Dingley et al. 1981, Sutton and Ganapathi 1978
Tryblidiella rufula (Spreng.) Sacc.	Patellariales	*Acacia spirorbis* Labill.	Vanuatu	McKenzie 1989
Uromycladium tepperianum (Sacc.) McAlpine	Uredinales	*Acacia spirorbis* Labill., Acacia sp.	New Caledonia, Vanuatu	Gibson 1975, McKenzie 1989
Veronaea sp.		*Cordia alliodora* (Ruiz & Pav.) Oken	Vanuatu	Ivory et al. 1993

Appendix 3. Forest plantation trees in the southern and western Pacific

Source: Waterhouse D.F. (1997) The Major Invertebrate Pests and Weeds of Agriculture and Plantation Forestry in the Southern and Western Pacific. ACIAR, Canberra.

+ + + very widespread and very important + + widespread and important + important locally

Species	**Family**	**Common name**	**Overall importance**
Acacia aulacocarpa Cunn. ex Benth.	Mimosaceae	hickory wattle	
Acacia auriculiformis Cunn. ex Benth.	Mimosaceae	ear-pod wattle	+++
Acacia confusa Merrill	Mimosaceae		
Acacia crassicarpa Cunn. ex Benth.	Mimosaceae	lancewood	+
Acacia mangium Wild.	Mimosaceae	brown salwood	+++
Adenanthera pavonina L.	Mimosaceae	Red beantree	
Agathis macrophylla (Lindl.) Mast.	Araucariaceae	Vanikors kauri	+++
Agathis moorei *(Lindl.) Mast.*	Araucariaceae		+
Agathis robusta (C. Moore ex F. Muell.)F.M. Bail.	Araucariaceae		
Agathis vitiensis (Seem.) Benth. & Hook. F. ex Drake	Araucariaceae	Dakua makadre	+++
Albizia sp.	Mimosaceae	albizia	+
Anthocephalus chinensis (Lam.) A. Rich. Ex Walp.	Rubiaceae	Laran	+
Araucaria cunninghamii Aiton ex D.Don.	Araucariaceae	hoop pine	+++
Araucaria hunsteinii K.Schum.	Araucariaceae	klinkii pine	+++
Azadirachata indica A.Juss.	Meliaceae	neem	
Barringtonia asiatica (L.) Kurz	Barrintoniaceae		+

Species	Family	Common name	Overall importance
Calophyllum inophyllum L.	Clusiaceae	beach calophylllum, dilo	
Calophyllum papuanum Laut.	Clusiaceae	calophyllum	
Calophyllum vitiense Turrill	Clusiaceae	calophyllum, damanu	+++
Campnosperma brevipetiolata Volk.	Anacardiaceae	campnosperma	+
Casuarina equisetifolia J.R. & G. Forst.	Casuarinaceae	casuariana, velau	+
Cedrella odorata L	Meliaceae		
Cordia alliodora (Ruiz & Pavon) Cham. ex DC	Boraginaceae	salmwood. laurel, cypre	+++
Cordia subcordata Lam. & Poiret	Boraginaceae	sea trumpet	
Dacrydium nidulum de Laubenfels	Podocarpaceae	Yaka	++
Decussocarpus vitiensis (Seem.) de Laubenfels	Podocarpaceae	dakua salusalu	++
Endospermum macrophyllum (Muell. Arg.) Pax et K. Hoffm.	Euphorbiaceae	kauvula	++
Endospermum medullosum L. S. Sm.	Euphorbiaceae	basswood	++
Eucalyptus deglupta Bl.	Myrtaceae	kamarere	++
Eucalyptus pellita F. Muell.	Myrtaceae	red mahogany	
Eucalyptus robusta Smith	Myrtaceae	swamp mahogany	+
Eucalyptus tereticornis Smith	Myrtaceae	forest red gum	
Garcinia myrtifolia A. C. Sm.	Clusiaceae	laubu	++
Gmelina arborea L.	Verbenaceae	yemane	++
Gmelina vitiensis (Seem.) A. C. Sm	Verbenaceae	rosawa	+
Gonystylus punctatus A. C. Sm.	Gonystylaceae	mauota	+
Grevillea robusta Cunn. Ex R. Br.	Proteaceae	silkyoak	

Species	Family	Common name	Overall importance
Heritiera omithocephala Kosterm.	Sterculiaceae	rogi, rosarosa	+
Intsia bijuga (Colebr.) O. Kuntzeq	Caesalpiniaceae	ifilele	+
Khaya senegalensis (Desr.) A.H.L.Juss.	Meliaceae	African mahogany	+
Maesopsis eminii Engl.	Rhamnaceae		
Myristica castaneifolia A. Gray	Myristicaceae	kaudamu	++
Ochroma lagopus Sw.	Bombacaceae	balsa	++
Octomeles (=Erina) sumatrana Mig.	Tetramelaceae		+
Palaquium hornei (Hartog & Bak.) Dubard	Sapotaceae	Sacau	+
Palaquium porphyreum A.C. Sm. & S. Darwin	Sapotaceae	Bauvudi	+
Pinus caribaea Morelet, var hondurensis Barrett & Golfarr	Pinaceae	Caribbean pine	+++
Pinus chiapensis (L.)	Pinaceae		+
Pinus elliotii Engelm.	Pinaceae	slash pine	++
Pinus merkusii ungh. et De Vriese	Pinaceae	Mindoro pine	+
Pinus patula Schldl. and Cham.	Pinaceae		
Pometia pinnata J. R et G. Forst. F	Sapindaceae	Taun	++
Pterocarpus indicus Wild.	Papilionaceae	New Guinea rosewood, narra	
Securinega flexuosa (Muell. Arg.)	Euphorbiaceae	Poumuli	+++
Swietenia macrophylla King	Meliaceae	American mahogany	+++
Tectona grandis L.f.	Verbenaceae	teak	+++
Terminalia brassii Exell	Combretaceae	brown terminalia	++
Terminalia calamansanai (Blco.) Rolfe	Combretaceae	Yellow-brown terminalia	+++

Species	Family	Common name	Overall importance
Terminalia catappa L.	Combretaceae	Indian almond	+
Toona australis (F. Muell.) Harms	Meliaceae	Australian red cedar	++