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report for Australia and New Zealand
1998/99

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**ANNUAL PEST, DISEASE, AND QUARANTINE STATUS REPORT FOR
AUSTRALIA AND NEW ZEALAND 1998/99**

Sixth Meeting

of

Research Priorities and Coordination Committee

Busselton, 1-3 September, 1999

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1998/99



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DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Ministerial Council for Forestry, Fisheries and Aquaculture

**STANDING COMMITTEE ON FORESTRY
RESEARCH PRIORITIES
AND COORDINATION
COMMITTEE**

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**ANNUAL PEST, DISEASE, AND QUARANTINE STATUS REPORT FOR
AUSTRALIA AND NEW ZEALAND**

1998-99

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INTRODUCTION

1. This report presents the annual statement of forest pest and disease conditions throughout Australia and New Zealand for the year 1998-99, and also incorporates the disease quarantine statement for the two countries. Following the recent reorganisation of the research working group structure, and the amalgamation of RWG 7 (forest pathology) and RWG 8 (entomology) into one forest health research working group, the pest and disease reports are here combined for the first time as a single document. The report follows from outcomes in the 1998 Operating Plans for RWG 7 and RWG 8, and is summarised from the individually submitted state and country reports (Annex A).

PURPOSE

2. To communicate the annual statement of forest pest and disease conditions and disease quarantine situation in Australia and New Zealand to the Standing Committee on Forestry for its information, consideration, and any action deemed necessary.

CONSIDERATION

AUSTRALIA

Plantations:

Pinus radiata (and other temperate pines):

Pests:

Sirex Wood Wasp (*Sirex noctilio*)

3. Queensland remains free of *Sirex* wood wasp. However the number of trap tree sites has been increased and the programme extended to include plantations at Gambubal near Warwick.

4. The incidence of naturally struck trees remains very low in those areas that have been surveyed (Bombala & Bathurst). Ground surveys will again be concentrated in drought stressed areas where last year (1998) large numbers of pines were killed due to infection by *Sphaeropsis sapinea*. In some areas, numbers of nematodes and parasitoids were below the desired levels. Inoculation with parasitic nematodes should be increased in these drier areas to prevent a potential increase in *Sirex* numbers. Billets of naturally struck trees have been caged to assess the percentage of nematode positive wasps in the natural population.

5. *Sirex* has remained at very low levels throughout 1998-99 in most pine areas of Victoria. However, due to the dry conditions experienced over the past two years, growers have been advised to ideally thin where possible, or increase trap tree plots and subsequent inoculation with nematodes in unthinned stands to ensure *Sirex* populations are kept at manageable levels. Mention should be made of emergence data gathered over summer 1998-1999 that has indicated the parasitic wasp *Ibalia leucospoides* has reached in some areas of the state, a 70 to 80% level of *Sirex* parasitism. This is very pleasing given the low level of parasitism (approximately 25-30%) recorded during its initial releases in the early 1980s.

6. The annual Forestry Tasmania survey of unthinned and suspect compartments is currently being undertaken. *Sirex*-killed trees have been located in two northern compartments which have a recent history of *Sirex* activity. Small numbers of trees are present, mainly subdominants. Several shipments of *Sirex* parasitoids were sent to Brazil and South America last year and requests for *Rhesus persuasoria* have been received for the current year from those countries and Argentina.

7. There has been little evidence of *Sirex* this year in any plantations in South Australia. Observation flights in May and June in the South East of South Australia found no dying trees with symptoms of *Sirex* attack. No *Sirex* emerged from billets in the 1998-99 summer period. Some *Megarhyssa* and *Schlettererius* were released at several sites near Mt Burr. Sixteen trap tree plots were established in ForestrySA plantations in December 1998. Felling and inoculation of these plots will start in July 1999. A total of 44 million nematodes have been ordered from CSIRO, 30 million for Auspine, 12 million for ForestrySA and 2 million for CSR.

8. *Sirex* monitoring continues with no current evidence of the wasp in Western Australia.

Five Spined Bark Beetle (Ips grandicollis)

9. *Ips* remains south of the quarantine border at Maryborough in Queensland. There has been no observed or reported damage by this insect during the past year in this state.

10. As a result of the analysis of the January - February, 1999, *Ips grandicollis* pheromone traps from State Forests' Hume Region (Tumut-Tumbarumba) in New South Wales, an inspection was organised of various logging and trap sites in the *Pinus radiata* plantations in that region. Moderate numbers of adult beetles were observed in these traps, and also active beetles and larvae in logs. With this level of beetle activity in the area, we can now report that the beetle is established in Hume Region. This transforms the *Ips grandicollis* situation from purely a monitoring-surveillance mode to a monitoring-management mode.

11. Apart from a minor infestation in the north east of Victoria, where approximately 50 *P. radiata* trees age three were affected, no major *Ips* outbreaks have occurred in the state. Growers are being advised to monitor plantation sites for *Ips*, especially during summer on logged sites with large amounts of fresh green slash adjacent to young stands.

12. In South Australia a small number of trees (30-40) at Comaum have been affected by *Ips*. These trees are *Pinus pinaster* and are adjacent to a recently clear felled area. A ground check will be carried out shortly. There has been no other *Ips* activity.

13. Despite the dry summer for 1998-1999 in Western Australia no outbreaks of *Ips grandicollis* have been reported.

Other Bark Beetle Species

14. The Golden Haired Bark Beetle (*Hylurgus ligniperda*) was first recorded in *P. radiata* waste at Passchendaele in Queensland, in 1997. It is still active in that area but has not been recorded further north. A minor outbreak of this beetle was recorded in young *P. radiata* plantings in Gippsland, Victoria. The source of the infestation was traced to an adjacent small stand of old *P. radiata* trees that was removed, resulting in the cessation of the infestation.

15. No evidence of damage to new plantings from the Black Pine Beetle (*Hylastes ater*) was observed in New South Wales. Although this beetle was present in most Forestry Tasmania stands there were no problems in newly planted sites.

Monterey Pine Aphid (Essigella californica)

16. In Queensland, the Monterey pine aphid was found in plantations in Gambubal near Warwick in December, 1998, in the Passchendaele, Mt SugarLoaf (Stanthorpe)

and Pechey (near Toowoomba) plantations in January 99 and at Esk in March 99. It has not yet reached the Beerburrum plantations. Monitoring sites have been set up at Pechey and Esk, aphid populations and tree health are recorded monthly. The Beerburrum plantations are being inspected regularly.

17. Since the detection of *Essigella californica* in Australia in March 1998 the species has been found to be abundant and widespread in eastern Australia. During 1998-1999 surveys were carried out by the Forest Health Survey Unit in the major pine growing areas in New South Wales, especially in State forests dominated by *Pinus radiata*. In July, 1998 State Forests of NSW Forest Health Survey Unit set up two *Essigella* monitoring sites in Carabost State Forest, Tumbarumba. The number of monitoring sites was increased to seven in February 1999 – two in the Macquarie Region (Bathurst & Oberon), two in the Monaro Region (Bombala) and one in the Hume Region (Tumut).

18. The Monterey Pine Aphid (*Essigella californica*) has now been recorded in all pine growing areas of Victoria. Trees defoliated in mid 1998 showed signs of refoliation as of summer 1999. In autumn 1999, *Essigella* populations showed signs of once more increasing with attack predominantly occurring in thinned *P. radiata* aged 15 years or more. Monitoring protocols developed by Debbie Kent (State Forests NSW) have been established across the state to more closely monitor aphid populations and tree health.

19. Monitoring throughout the Forestry Tasmania pine estate and nurseries at different times during the summer and autumn failed to detect the aphid. Similar surveys will be conducted this year.

20. The *Essigella* aphid is now widespread throughout pine plantations in South Australia. There has been severe yellowing and defoliation but there has also been severe drought stress in many areas this year. In May ForestrySA flew over the South East plantations and estimated the area showing symptoms of drought-aphid damage. Results were as follows:

- 15810ha lightly affected (< 5% of trees)
- 9358ha medium affected (5-30% of trees)
- 3819ha heavily affected (> 30% of trees)

making a total of 28987ha affected to some degree. Recent reports from field staff suggest that trees that suffered even severe defoliation are now showing signs of regrowth at the tips.

21. The Monterey pine aphid, *Essigella californica* to date has not been detected in Western Australia.

Pine Aphid (Eulachnus thunbergii)

22. *Eulachnus thunbergii* is present in all the plantations in Queensland. In the areas where *Essigella* is present, *Eulachnus* is found on the same trees, but in greater numbers than *Essigella*. Populations of the aphid will be monitored this year.

23. Surveys in New South Wales initiated to monitor the distribution of *Essigella* have also collected distribution data on *Eulachnus thunbergii*. The distribution of *E. thunbergii* has not changed, with the southernmost record in the state still Oberon. Interestingly, *E. thunbergii* has been found on the same *P. radiata* trees as *E. californica*.

Other Pests of Pine

24. In November 1998 the Pine Looper, *Chlenias* sp. was reported in a 1990 age class of *Pinus radiata* in Carabost State Forest in New South Wales. These species of Australian defoliators attack a wide range of hosts including *Eucalyptus* and have been reported to cause serious damage to *P. radiata*. A subsequent survey of the area showed that the infestation was very localised and control was not initiated.

25. There were no serious outbreaks of wingless grasshoppers in the pines in New South Wales this year. Monitoring of grasshopper numbers will be conducted in spring and summer in Tumbarumba in 1999 where *Phaulacridium vittatum* has previously been a problem.

26. Aerial and ground surveys of possum damage in pines was conducted in Bombala, New South Wales, in June. Extensive damage has been caused by possums in Bombala in recent years, and the damage has increased again this year, mainly in area of plantation affected, with possums moving into areas previously undamaged.

27. Browsing from wallabies was a problem in young stands adjacent native bush and retention strips in many regions in New South Wales. Wallabies strip bark off at the base of young pines. In some cases up to 90% of young trees are attacked. The implications of this damage on wood quality are unclear. Less than 1% of trees were killed as a result of wallaby damage.

28. Some minor armyworm (Hadeninae) and wingless grasshopper (*Phaulicridium vittatum*) damage was recorded in newly established radiata pine plantations in the south west of Victoria. Prompt control measures were implemented before potentially serious damage occurred.

29. The Forestry Tasmania Forest Health Survey team detected considerable defoliation to a four-year-old planting by adult weevils. Adult weevils have been tentatively identified by ANIC as *Scotasmus* sp (*Peripagis* sp.) a genus confined to Tasmania at present. Surveys will be repeated in spring.

30. In young *Pinus pinaster* plantations in Western Australia Rutherglen bug (*Nysius vinitor*) has been a problem in agricultural areas.

Diseases:

Foliage

31. Dothistroma needle blight caused by *Dothistroma septosporum* (synonyms, *D. pini*, *Eruptio pini*, *Mycosphaerella pini*, *Schirria pini*) continued to defoliate *Pinus radiata* in 1998-99 at Gambubal Forest in the Dividing Range in southern

Queensland. Incidence of this disease was initially very low in most of New South Wales during winter, but infection increased substantially following heavy rainfall in spring, and levels exceeded those observed during the previous 2-3 years. Severe infection (ranging 15-90%) has developed in areas subject to fog and misty rain, including Monaro region (Bombala), Hume region (Tumbarumba), and Acacia Plateau near Urbenville in northern New South Wales. Further disease surveys are to be undertaken in August-September, 1999, and control spraying of some stands with copper fungicide is under consideration. Rainfall was also above average in Victoria, but incidence of *Dothistroma* needle blight has remained low in this state. *Dothistroma* needle blight has continued to cause little concern in Tasmania.

32. *Cyclaneusma* needle cast caused by *Cyclaneusma minus* was widespread in plantations of *Pinus radiata* in New South Wales, where symptoms were associated with infestation by the Monterey pine aphid (*Essigella californica*). In Tasmania, growth has been slow following pruning of *P. radiata* affected by the related Spring needle cast disease, which atypically may be active throughout the full rotation in *P. radiata* stands in the northwestern part of the state. Insufficient clearwood in harvested logs has led to problems in meeting sawlog volume targets.

Shoots and stems

33. Diplodia dieback disease caused by *Sphaeropsis sapinea* (synonym, *Diplodia pinea*) was widespread and severe in *Pinus radiata* plantations at Paschendaele Forest in Queensland, stressed by drought, overstocking, adverse soil conditions, and hail damage. Salvage logging was carried out in the worst areas. Moderate to severe damage (up to 45% of trees dead or with dieback) was also widespread in most state-owned *P. radiata* plantations in New South Wales. Worst damage in this state was also associated with stress from drought, overstocking, shallow soils, exposed sites, and nutrient deficiencies. However, salvage logging was rarely attempted, and surveys in June, 1999, indicated that damage in New South Wales this year was much less severe. A low incidence of Diplodia dieback disease was present throughout young stands of *P. radiata* in Tasmania, where it was not considered to have had a significant impact.

34. In Western Australia terminal shoot damage associated with infection by *Aureobasidium* and *Sydowia* (*Sclerophoma*) occurred in stands of *Pinus pinaster* near Perth (Figure 1). Severe infection led to tip dieback and the formation of multiple leaders. The effect of the disease on subsequent tree form is being monitored.

Roots

35. Armillaria root disease caused by *Armillaria novae-zelandiae* and *A. fumosa* was observed in young plantations of *Pinus radiata* near Urbenville in northern new South

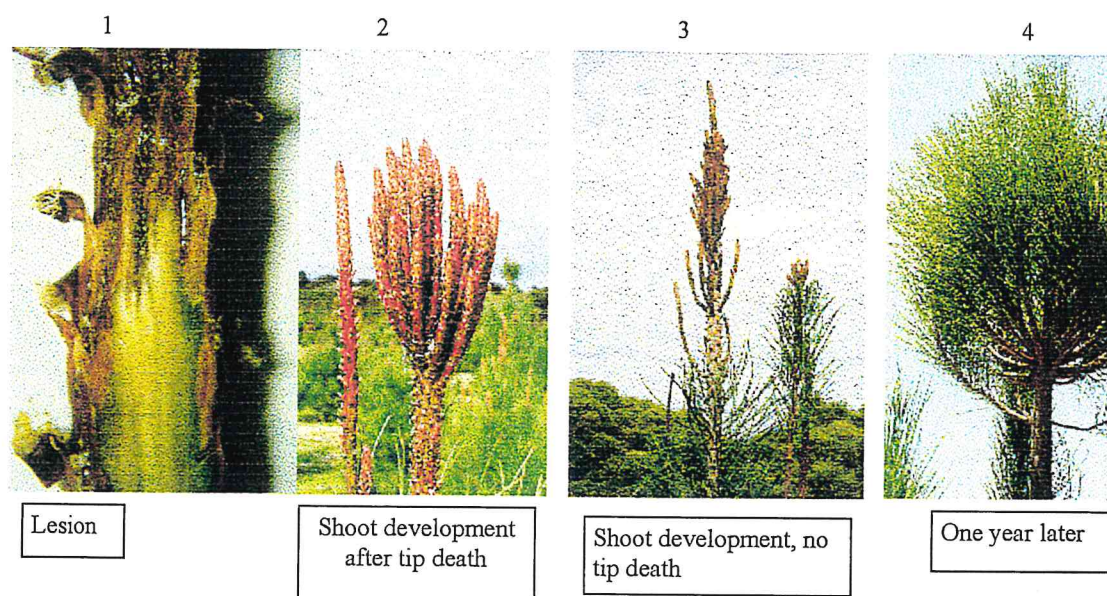


Figure 1: Shoot dieback disease in *Pinus pinaster* north of Perth, Western Australia.

Wales, on a site previously stocked in Bunya pine (*Araucaria bidwillii*) with a history of *Armillaria* infection. Mortality in the pine plantation ranged 2-4%, with localised incidence up to 8%. Mortality due to *Armillaria* root disease is normally rare in pine plantations in New South Wales.

Environmental

36. Drought conditions were responsible for defoliation and dieback of 30-year-old *Pinus radiata* trees near Myrtleford in southern Victoria, possibly in interaction with *Essigella californica*. Frost caused damage in Christmas tree plantations around Ballarat and among two-year-old seedlings at Rennick.

Other

37. There was concern in Tasmania following the detection of stem and branch galls in several, mainly 1997 plantations of *Pinus radiata* in the northeast of the state. Incidence of affected plants was ca. 1 in 1000. Following detailed study it was decided that the galling symptoms were not induced by *Endocronartium harknessii* (synonym, *Peridermium harknessii*; western gall rust disease), which has not been found in Australasia, but the cause was not determined (refer Paragraphs 194, 210).

38. Minor or localised problems in *Pinus radiata* plantations in Australia included: deaths from root coiling in a Christmas tree plantation in the Latrobe Valley, Victoria, *Phytophthora*-associated mortality patches in a young seed orchard (*P. cinnamomi* and *P. citricola*), and a needle-drooping disorder of trees growing on poorly drained soils in

Sub-tropical and tropical *Pinus* species:

Pests:

39. Monitoring in Queensland plantations for *Sirex noctilio*, *Ips grandicollis*, *Essigella californica* and *Eulachnus thunbergii* is reported above (Paragraphs 3, 9, 16, 22). High populations of Florida wax scale (*Ceroplastes floridensis*) were still active on *Pinus caribaea* at Lannercost, in northern Queensland.

Diseases:

40. Occasional, sometimes significant damage from Diplodia dieback (*Sphaeropsis sapinea*) occurred on pines in Queensland (stem malformation and poor form was present in a significant proportion of trees at Byfield).

41. Phytophthora root rot caused by *Phytophthora cinnamomi* was responsible for scattered mortality in plantations of hybrid *Pinus caribaea* var. *hondurensis* x *Pinus elliottii* var. *elliottii* in southeastern Queensland, especially on excessively wet sites. Overall damage was not significant.

Hoop pine (*Araucaria cunninghamii*):

Pests:

42. There was minor damage to young stressed *Araucaria cunninghamii* trees by the bark beetle *Hylurdretonus piniarius* in plantations in southeastern Queensland.

Diseases:

43. Root diseases continued to affect hoop pine plantations in southeastern and northern Queensland. *Phellinus noxius* (synonym, *Fomes noxius*) was the main pathogen in first rotation stands, whereas *Junghuhnia vincta* (synonyms, *Poria vincta*, *Rigidoporus vinctus*) caused greatest mortality in second rotation plantations. Some losses also resulted from infection by *Rosellinia* species. Observation plots in plantations in southern Queensland indicated that early mortality due to root diseases in second rotation stands up to six years old currently ranges 2-7% per year.

44. Minor dieback in hoop pine stands was caused by *Botryosphaeria ribis* in Queensland. Both the sexual and asexual (*Dothiorella* sp.) reproductive stages were seen.

Eucalyptus species:

Pests:

Psyllids

45. Psyllids have not yet been reported as causing any problems in joint venture or trial plantations established in Queensland since the inception of the Private Plantations Initiative (PPI) in 1997. Most plantations are still too young (2 years old) to expect problems from this insect group.

46. The New South Wales Forest Health Survey Unit observed damage from *Cardiaspina fiscella* and *C. maniformis* in 2- to 5-year-old *E. grandis* plantations in northern NSW this summer-autumn. In only a few cases was damage severe, with over 75% of trees in a plantation attacked and up to 50% severity (leaf area damaged) causing defoliation. In most cases, however, damage from psyllids in these young plantations was minor.

47. An outbreak of a lerp forming psyllid *Creiis* sp. nr. *literalta* caused extensive damage in a 3-year-old *E. dunnii* plantation near Casino, in northern New South Wales (Morpeth Park). Severe damage occurred to trees, where up to 100% of leaves were damaged and killed. Up to 100 ha were affected. Recovery of this site is being monitored: some trees have died, and many are producing epicormic shoots. This is the first record of this species of psyllid causing extensive damage in *E. dunnii*. The insect was also observed at two other sites, but only at minor levels. It appears that the outbreak at Morpeth Park began around October-November 1998, and peaked in December, before suddenly declining. There were very few active insects observed in February 1999. Psyllid activity will be closely monitored from September onwards. This site was subject to waterlogging, which may have exacerbated this problem.

48. In Victoria, low levels of psyllid damage (*Cardiaspina* spp.) were recorded on *E. camaldulensis* plantations in the Shepparton irrigation region during early summer 1999. Populations observed were not likely to warrant control measures being implemented, although subsequent activity levels have been monitored to ensure populations remain at low levels.

Autumn Gum Moth (Mnesampela privata)

49. No records yet from joint venture or trial plantations established since 1997 in Queensland.

50. Minor damage was observed in young *Eucalyptus nitens* plantations in southern New South Wales by *Mnesampela privata*.

51. Apart from isolated localised outbreaks causing moderate levels of defoliation, Autumn Gum Moth populations remained at predominantly trace to low levels across the eucalypt plantation estate in Victoria during 1998- 1999.

52. Several young Forestry Tasmania plantations were monitored using light-traps and ground surveys but populations were low. A significant occurrence of *Mnesampela privata* larvae was noted on one- and two-year-old *E. nitens* and *E. globulus* ETF (Eucalypt Tree Farms, North Eucalypt Technologies) plantations at Woolnorth in far NW Tasmania. Some other minor occurrences were noted in northern and eastern Tasmania

53. Eucalypt plantations in South Australia continue to be regularly attacked by Autumn Gum Moth, which is the major insect pest in plantations. Spraying for this pest has been carried out in several plantations.

Leaf Beetles

54. Leaf beetles became increasingly important pests in the second year of plantings in the PPI program in Queensland. The main species involved has been *Paropsis* sp. nr. *atomaria* which appears to have a very wide host range. Damage has been especially severe on *Eucalyptus pilularis* (blackbutt; from age one year) and *Eucalyptus cloeziana* (Gympie messmate; from age two years). Severe defoliation due to this species was noted in three, two-year-old *Eucalyptus cloeziana* joint-venture plantations during 1998-99. In two of these plantations severe defoliation was observed by early December 1998, necessitating insecticide application in one, while in the other high levels of bird predation apparently ended the infestation. Other species commonly recorded in plantations include *Chrysophtharta cloelia* (particularly in northern Queensland) and *Paropsis variolosa*. A research program is currently being developed into *P.* sp. nr. *atomaria* with the aim of developing a population model.

55. *Monolepta australis*, the red-shouldered leaf beetle, was also recorded defoliating *E. grandis* and hybrids near Maryborough, Queensland, in November 1998. This was the first record of this species in current plantations.

56. Both *Chrysophtharta cloelia* and *Paropsis atomaria* were amongst the most destructive pests in young eucalypt plantations in northern New South Wales. In some cases trees were totally defoliated by these insects (as well as Christmas beetles). *E. dunnii* and *E. grandis* were the two most damaged hosts.

57. There were no serious outbreaks of *Monolepta* beetles observed this year. This species was observed causing minor damage in a two-year-old *E. grandis* plantation though, which is a new host record for *Monolepta australis* in young eucalypt plantations in NSW.

58. Low levels of damage by the leaf beetle *Chrysophtharta agricola* and *C. variicollis* were observed on *E. viminalis* and *E. globulus* plantations in East Gippsland, Victoria. Damage however, was not widespread and tended to be confined to small sections of the plantation estate in the upper 50% of the tree crown.

59. A total of 108 coupes, aged 18 months to five years of age, were monitored by Forestry Tasmania over the summer period for the chrysomelid species, *Chrysophtharta bimaculata* and *Chrysophtharta agricola*. Larval populations in the estate were low but newly emerged adults feeding in autumn caused considerable damage. Options for controlling adult populations of leaf-beetles in autumn are being reviewed. Development of the IPM monitoring system continues to evolve enabling coverage of the expanding estate to be both practical and economic. Minor damage by various other chrysomelid species has also occurred in many planting's but had little effect on coupe increment.

60. Some large populations of *Chrysophtharta agricola* attacked *E. nitens* ETF (North Eucalypt Technologies) in northern Tasmania. 714ha. were aerially sprayed with the synthetic pyrethroid "Dominex" to control these outbreaks and successful control was achieved in the areas sprayed.

61. The Chrysomelid *Cadmus excrementarius* has caused significant defoliation this past season on *E. globulus* in Western Australia.

Sawflies (Perga spp.)

62. *Perga* spp. sawflies have been recorded in some trial plantings in Queensland, but generally numbers have been low and damage insignificant in southeastern Queensland. In northern Queensland, more severe sawfly defoliation has been reported on *E. pellita* (red mahogany) in some trials.

63. Minor damage to eucalypt plantations in New South Wales was attributed to sawfly larvae. In most cases damage occurred to isolated trees, where up to 50% of the foliage had been eaten.

64. In Victoria, low levels of damage by the steelblue sawfly (*Perga affinis affinis*) have been recorded in *E. camaldulensis*, *E. globulus* and *E. occidentalis* plantings between three- and six-years-old in the Shepparton (north central) area. Damage tended to be confined to isolated and small groups of trees, with the upper 50% of the tree crown suffering the most defoliation.

65. Minor damage by sawflies (*Perga affinis*) occurred in many Forestry Tasmania planting's but has had little effect on coupe increment.

66. Sawfly larvae have caused considerable damage in some plantations in South Australia. Spraying for this pest has been carried out in several plantations.

Christmas Beetles (Anoplognathus spp.)

67. *Anoplognathus porosus* and *A. boisduvali* have been the most common species observed in Queensland plantations, though damage levels have generally remained low. *E. cloeziana* appears to be the most resistant species and hybrids of *E. grandis* with *E. tereticornis*, *E. camaldulensis* and *E. urophylla* the most susceptible. Some variation in susceptibility within families of these hybrids has been observed and will be investigated further.

68. Christmas beetles (*Anoplognathus* spp.) caused defoliation in late spring/early summer in many young eucalypt plantations in northern New South Wales, with *E. grandis*, *E. dunnii* and *Corymbia maculata* being the most severely damaged. Most of these damaged trees showed signs of recovery by late summer early autumn. In one case, an *E. dunnii* plantation was totally defoliated by Christmas beetles (and also chrysomelids).

69. In Victoria, low levels of Christmas beetle (*Anoplognathus* spp.) damage were recorded on 1-2 year old *E. globulus* plantations in Gippsland and North East Victoria during summer 1998-99.

Leaf Blister Sawfly (Phylacteophaga froggatti)

70. Attack by leaf blister sawfly has been reported in plantations in Queensland, but incidence has usually been restricted to single, isolated trees. An exception in a trial planting occurred when up to a dozen young (less than one-year-old) *E. grandis* x *E. camaldulensis* hybrids were attacked, with some consequent mortality.

71. Severe outbreaks of leaf-blister sawfly larvae (*Phylacteophaga froggatti*) occurred in a few *E. dunnii* and *C. maculata* plantations in northern New South Wales. In some cases extensive damage had occurred to young plantations (two-year-old), where up to 100% of trees were damaged at up to 50% severity (leaf area damaged). These severely infested stands were in waterlogged areas, perhaps exacerbating the problem.

72. In Victoria, low levels of the leaf-blister sawfly (*Phylacteophaga froggatti*) were recorded on young juvenile foliage of *E. grandis* plantations around Shepparton and northern Victoria. While some attacks were severe, these tended to be isolated to individual trees where damage up to 50% of the leaf area, confined predominantly to the lower crown, was recorded.

Stem Borers

73. Current plantations in Queensland are too young for wood moth attack to occur. However, previous trial plantings have shown that this insect is a potentially significant damage factor in this state, and its occurrence and impact will be closely monitored in future.

74. As for wood moths, the bulk of Queensland plantations are currently too young for *Phoracantha* spp. attack to occur, but these will also be closely monitored for in future as they mature. A research program is currently underway examining attractant bait and trapping of these beetles. Some establishment mortality (<5%) in Canterwood Ltd. plantations near Maryborough occurred in 1998 due to girdling by an unidentified longicorn., possibly *Eroschema* sp.

75. As the eucalypt plantation estate in New South Wales increases in age (many plantations now three- to five-years-old) the number of trees damaged by stem boring insects has increased. Both the number of plantations with damaged trees and the number of trees in these plantations with stem borer damage increased this year. In some cases, 45% of three- to four-year-old *E. grandis* trees in plantations on the north coast had stem borer damage. Longicorn beetles were again one of the main damaging insects, but there was more damage from cossid moth larvae this year. Again, *E. grandis* was the most damaged host (both cerambycid and cossid), followed by *E. pilularis* (mainly cerambycid). Cockatoos had caused damage to some of the *E. grandis* trees infested with cossid moth larvae.

76. Damage from Xyloriditids in New South Wales was mainly confined to trees with small diameters (<7cm) or branches. *E. grandis* and *E. pilularis* were the two most damaged hosts.

77. It was also observed by the Forest Health Survey Unit while travelling around New South Wales on field trips that many small diameter (<10cm) amenity plantings (*Eucalyptus*, *Acacia* and *Casuarina*), especially along roadsides and in parklands, had been attacked and killed by stem borers (cerambycids and xyloictids ?). This is a higher number than was observed in previous years.

78. Activity by the cerambycid *Phoracantha mastersi* has been minor in Tasmania (Forestry Tasmania) except in a few northern small woodlots where trees have been killed.

Other Pests of Eucalypt Plantations

79. No records to date of the Gum Leaf Skeletoniser observed in joint venture or trial plantations in Queensland established since 1997.

80. Swarming leaf scarabs, mainly *Automolius* and *Liparetrus* spp., were observed in very high numbers across southeastern Queensland during the period September - November 1998. These beetles preferentially feed on leaf buds and newly expanding foliage and can reduce early season growth rates substantially. At this stage in plantation development, they, along with the paropsine leaf beetles, are the most significant insects affecting plantation productivity. Most species in the planting program appear to be susceptible to these beetles, with *E. cloeziana* perhaps being the most resistant. Possible differences in resistance to the scarab *Epholcis bilobiceps* between hybrids have also been noted in North Queensland.

81. No records of Wingless Grasshopper attack in Queensland, and no further records of cicada damage following on from that reported in 1997-98.

82. General comments on eucalypt plantations in Queensland: After the first two years of plantings under the Private Plantations Initiative (PPI), chrysomelid leaf beetles have manifested themselves as the most significant pests in joint ventures in this state. Other insects causing significant levels of damage in these early plantings have been swarming scarabs and to a lesser extent christmas beetles. Research is being initiated into the biology and ecology of *Paropsis* sp. nr. *atomaria* to address the many unknowns related to this species.

83. Early plantations in the Queensland DPI-Forestry joint venture scheme have been established mainly for high value timber production and so it is anticipated that borers will be of special significance in their ongoing economic viability. Research is being initiated into both cossid wood moths and longicorn beetles to address a severe knowledge deficit for these insects. Findings from a 10-year-old trial plantation indicated that both *Phoracantha* sp. and *Endoxyla cinerea* preferentially attacked the larger, fastest growing trees within the plantation. This finding has been corroborated with other research on similar insects overseas, but is at odds with accepted wisdom that vigorous trees are more resistant to borer attack.

84. In most cases in New South Wales, gum tree scale (*Erriococcus* spp.) was observed at very low levels in young plantations (<1% incidence), and often infested trees were on waterlogged sites and/or under stress. The majority of hosts were *E.*

grandis. In one case though, up to 20% of a 2-year-old *E. grandis* plantation had gum tree scale. This was a waterlogged site.

85. An outbreak of phasmatids (*Didymuria violescens*) in native state forests in Hume Region (Tumut-Tumbarumba), New South Wales, was reported to the Forest Health Survey Unit in May 1999. This area was aerially surveyed using the Automated Real-Time Mapping Software system that uses GPS to plot the route of a vehicle (in this case a helicopter) that can be overlaid onto GIS maps. The damage was extensive, covering approximately 8570 ha in three state forests (Buccleuch SF – 4645 ha, Bago SF – 2190 and Maragle SF – 1735 ha). The main eucalypt species attacked was *E. radiata*, *E. dalrympleana*, but *E. delegatensis* and *E. pauciflora* were also damaged. Total defoliation of some trees was observed. A similar outbreak in the same area occurred during the 1950s and early 1960s, causing extensive damage and loss of growth. Some areas were control sprayed with insecticide. The current outbreak will be monitored in the following years to determine if control methods need to be applied.

86. Minor Gumleaf Skeletoniser (*Uraba lugens*) damage was noted on four-year-old plantings of *E. camaldulensis* in northern Victoria although no control measures were required. Low levels of Gumtree scale (*Eriococcus* spp.) were also observed on two-year-old *E. globulus* plantings in Central Gippsland. In some patches, up to 20-30 trees were affected although subsequent observations noted levels declining and consequently, no control was required.

87. Although Gum Leaf Skeletoniser is present in most plantations in Tasmania (Forestry Tasmania), little activity was recorded. It has been noted that many species of smooth barked eucalypts, but especially *E. globulus*, have horizontal markings especially in the bole area caused by weevil larvae tunnelling in the cambial layer just under the bark. Cages were attached to some of these trees and adult weevils captured. The weevil has been identified by ANIC as *Pelororhinus transversus*. Many *E. globulus* trees damaged by the weevil are subsequently attacked by the cerambycid *P. mastersi*. Minor damage by scarabs (*Heteronyx* spp.) has occurred in many Forestry Tasmania planting's but has had little effect on coupe increment.

88. An outbreak of *Uraba lugens* was detected in 6 year old North Eucalypt Technologies *E. nitens* ETF near Biralee in northern Tasmania. Two sides of the ETF were bounded by native forest, and the attack was heaviest on ETF trees in the rows adjacent to this boundary where many trees were more than 90% defoliated.

89. Large populations of *Heteronyx* cockchafer beetles occurred on newly established (less than one year old) North Eucalypt Technologies *E. nitens* ETF in northwestern Tasmania at sites with an elevation of greater than 500m above sea level. Two main species have been identified, *Heteronyx crinita* Blackburn, and *H. dimidiata* (Erichson). These two species caused heavy defoliation damage to newly planted seedlings at several sites. The adult beetles burrow into the soil around the seedlings when they are not actively feeding. Life-cycle studies were undertaken, and larvae of *H. crinita* were observed in the soil from January through to June.

90. A joint bid with Western Australia for CRC for Sustainable Production Forestry Strategic Initiatives Fund funding for collaborative work on African Black Beetle-Spring Beetle (*Liparetrus jenkinsii*)-*Heteronyx* biology and control was successful. This will allow detailed field studies to be undertaken in Western Australia and Tasmania between August 1999 and February 2000 (North Eucalypt Technologies).

91. A new species of weevil (as yet unnamed) has been found attacking newly planted eucalypt seedlings in one plantation in South Australia. The tiny weevils ringbark the seedlings and are extremely well camouflaged on the stems.

92. In Western Australia, a new contract entomologist who is funded through the CRC, the Western Australian Industry Pest management group and directed by CSIRO will be starting in Manjimup in July 1999. The entomologist will investigate insect problems of *E. globulus* such as weevils (*Oxyops* and *Gonipterus*), spring beetles, African black beetle, autumn gum moth and Chrysomelids. It is expected this work will take three years.

Site Related Eucalypt Plantation Problems

93. A higher than usual number of plantations suffered from waterlogging this year in New South Wales, due to the heavy rains on the north coast. *E. dunnii* was the most affected species, possibly due to sites chosen for planting (low lying areas). Evidence of waterlogging included purple foliage and reduced growth rate (compared to trees on higher ground). Those trees that were severely affected by insects (eg. *Creiis* sp. in *E. dunnii* and leaf-blister sawfly larvae in *C. maculata*) were situated in waterlogged areas.

94. In April several severe frosts caused widespread damage in South Australia, especially to young trees 1-3 years old. Some were so badly affected there is some doubt as to whether they will survive.

Diseases:

Foliage

95. Foliar pathogens caused significant damage in eucalypt plantations in some states. Severe leaf blight following infection by *Cylindrocladium quinqueseptatum* was reported in farm forestry plantations of *Eucalyptus microcorys*, and on other eucalypt species and hybrids, in tropical northern Queensland between February and June, 1999. Disease development was rapid. Only *E. pellita* showed adequate resistance.

96. Leaf spotting and crinkling caused by *Mycosphaerella cryptica* was common in both southeastern and northern Queensland on young and old foliage of eucalypts, particularly *Eucalyptus globulus*, *E. grandis*, *E. tereticornis*, and hybrids of the last two species. Leaf spotting on *E. dunnii* was caused by *Mycosphaerella nubilosa*. A low incidence of infection by *M. cryptica* was also common in New South Wales, particularly on *E. saligna*, *E. nitens*, and *E. pilularis*. *M. suberosa*, previously reported only from Western Australia, was observed causing minor damage in several plantations of *E. dunnii* in New South Wales. *Mycosphaerella*-induced defoliation was the most widespread problem in plantations of *E. globulus* and *E. nitens* in

Tasmania, especially in the northwestern part of the state. However, damage was localised.

97. A low incidence of *Aulographina eucalypti* was reported on older leaves in young plantations of *Eucalyptus pilularis*, *E. globulus*, and *E. nitens* in New South Wales. Minor spotting caused by *Phaeophleospora epicoccoides* (synonyms, *Kirramyces epicocoides*, *Phaeoseptoria eucalypti*, *Mycosphaerella suttoniae*) was observed on older leaves of eucalypts in northern (*Eucalyptus pellita*, *E. cloeziana*, and *E. resinifera*) and southeastern Queensland (*E. camaldulensis*, *E. cloeziana*, *E. tereticornis*). *Phaeophleospora eucalypti* (synonyms, *Kirramyces eucalypti*, *Septoria pulcherrima*) caused limited damage in plantations of *Eucalyptus nitens* in southern New South Wales.

98. Leaf spotting due to infection by *Coniella fragariae* was common on lower foliage in many stands of *Eucalyptus dunnii* in New South Wales, especially in low lying wet areas. Damaged leaves were retained on diseased trees. Minor infection by this fungus was also recorded, for the first time, on *E. grandis*. In Queensland leaf blotching associated with species of *Coniella* and *Cryptosporiopsis* was observed on insect-damaged foliage of several eucalypt species.

99. A large number of microfungi recorded from eucalypt leaf lesions in Tasmania included species of *Anthostomella*, *Aurantiosacculus*, *Colletogloeopsis*, *Cylindrotrichum*, *Dichomera*, *Fairmaniella*, *Harknessia*, *Idiocedris*, *Microsphaeropsis*, *Ophiotothella*, *Pseudocercospora*, *Readeriella*, and *Vermisporium*. Although most records of these fungi were new for the state, damage to the hosts was insignificant (*Eucalyptus globulus*, *E. nitens*, *E. obliqua*, or *E. regnans*).

100. A scarcity of foliage diseases in eucalypt plantations in Victoria was attributed to dry conditions. Diseases were also not reported in South Australia, but locally severe leaf spotting was noted in southwestern Western Australia.

Shoots

101. Moderate to severe shoot blight caused by *Ramularia pitereka* (synonym, *Sporothrix pitereka*) occurred throughout the year in newly established joint venture and farm forestry *Corymbia* plantations in southeastern Queensland and north-eastern New South Wales. Repeated dieback resulted in stunting and malformation. There were indications that some host genetic sources are resistant. Infection was also occasionally found in nurseries.

102. *Gloeosporidina moravica* was associated with distinctive purplish lesions on shoots and foliage in one-year-old plantations of *Eucalyptus globulus* in northwestern Tasmania, though damage was uncommon. In the same region there was a low incidence of shoot damage in one-year-old *E. globulus* plantations caused by *Botrytis cinerea*.

Stems

103. Unexplained stem cankers were observed in two young joint venture *Corymbia variegata* plantations in southern Queensland. Copious kino flows became colonised by a sooty mould and an ascomycetous fungus. Stem canker damage and mortality caused by *Endothia gyrosa* were found in two young plantations of *Eucalyptus dunnii* in northern New South Wales. Incidence of dead and diseased trees ranged up to 10%. Epicormic shoots developed following dieback above the cankered areas.

104. Alcoholic flux was again observed in three- to four-year-old *Eucalyptus nitens* plantations in northeastern Victoria, apparently as a result of moisture stress. No trees have died, but the effect on wood quality is causing concern.

105. A low incidence of bacterial wilt caused by *Ralstonia solanacearum* (synonym, *Pseudomonas solanacearum*) occurred in a *Eucalyptus pellita* stand near Cardwell in northern Queensland following above average rainfall.

Roots

106. Mortality in young plantations up to two years old of *Eucalyptus cloeziana*, and especially *E. pilularis*, followed damage to roots and root collars associated with infection by *Phytophthora cinnamomi* on wetter sites in Queensland. In New South Wales there was also substantial *P. cinnamomi*-associated mortality in plantations of these hosts up to five years old. On poorly drained sites mortality was commonly ca. 10%. Contour ripping prior to planting appeared to have exacerbated the problem.

107. In northwestern Tasmania root and root collar lesions associated with a species of *Cryptosporiopsis* were present on dead and dying trees in three young plantations of *Eucalyptus nitens*. Symptoms in two of the stands developed rapidly on vigorous trees, whereas in the third stand the disease was more protracted and associated with shallow soils above basalt rock.

Environmental

108. Losses occurred in Victoria as a result of dry conditions in eucalypt plantations that normally experience good rainfall.

Other

109. Some losses in *Eucalyptus nitens* stands in northeastern Victoria were attributed to root coiling.

Red cedar (*Toona ciliata*):

Pests:

110. A major new ACIAR project in collaboration between Queensland and CSIRO Entomology is now underway on red cedar tip moth (*Hypsipyla robusta*). Damage from *H. robusta* (Lepidoptera: Pyralidae) has effectively prevented the commercial

growing of red cedar (*Toona ciliata*) throughout its native range in Queensland and New South Wales. The present project aims to identify resistant genotypes of *T. ciliata* and other Swietenioideae, assess the impact of companion planting and underplanting on *H. robusta* attack, and assess the effectiveness of insecticide and fertiliser application on promoting and protecting early *T. ciliata* growth. Trials with *T. ciliata* have been established in southeastern and northern Queensland, and further plantings are scheduled over the next six months. All plantings remain free of *H. robusta* damage to date. Trials are also to be established in Thailand, Philippines, Laos, Malaysia and Vietnam.

Managed natural forests:

***Eucalyptus* species:**

Pests:

111. Studies are continuing into the effects of repeated fuel reduction burning on litter invertebrates in dry sclerophyll eucalypt forest in west-central Victoria. Work on the short-term effects over three years has been mostly completed while studies examining the long-term effects over 10 years are in the process of being finalised. Work has also been done on the short-term effects of wildfires on litter invertebrates in mountain ash forests in the Victorian Central Highlands.

112. Observations of the population levels of the Mountain Ash Psyllid (*Cardiaspina biliobata*) are also continuing in Victoria, with recent work indicating they are currently at low levels.

113. Considerable damage is occurring in young Forestry Tasmania regeneration areas currently selected for thinning. Stem borers (hepialid moths, cerambycids, and weevils) combined with defoliators (chrysomelids and scarabs) are causing serious increment losses and form defects. An assessment system is now in place to measure damage levels enabling management recommendations to be made.

114. In Western Australia, jarrah leaf miner (JLM) research has now concluded, however opportunistic monitoring and regular mapping of expanding JLM populations (cut out boundary) north of Collie continues. The JLM outbreak receded in 1985-92. Research into *Uraba lugens* has also concluded. Results are currently being written up and include quantitative population measurements from 1986-1996. A study on the incidence of *Phoracantha acanthocera* (bullseye borer) in karri is complete and will be submitted for publication by August 1999. This study found: (1) an association with bullseye borer and incipient rot; (2) a minimum diameter preference in karri; (3) borer incidence greater in karri compared with marri; (4) a preference for dry sites. Other findings confirmed earlier work. A wider survey is now anticipated using presence-absence based on visual symptoms.

115. Current conservation studies in Western Australia include: (1) the impact of clearfelling of karri forest on invertebrates and macrofungi in litter and soil using pitfall trapping and a space for time approach; (2) the impact of logging and burning on selected invertebrate taxa in jarrah forest using the gap cutting and shelterwood silvicultural treatments; (3) fire impacts on invertebrates of red tingle forest. The tingle forest study is near completion and writing up has commenced. Preliminary

findings have shown different species groups in different fire ages. Burn ages included frequently burnt areas of < 5 years, vegetation managed areas with a fire frequency of 10-20 years, and long unburnt areas > 15 years unburnt. Gondwanan fauna were found in the long unburnt areas where the understorey vegetation had collapsed and deep litter layers had developed.

Diseases:

116. Severe crown dieback has developed in *Eucalyptus delegatensis* forests across wide areas of the Central Plateau in Tasmania. The disorder first appeared at the northern edge of the plateau in 1996, and trees subsequently appeared to recover, but health again deteriorated during the past year. The cause has not been determined. Many trees have died in *E. gunnii* forests on the Central Plateau as a result of severe possum defoliation.

117. In Western Australia attention continued to be directed to the management of root diseases in eucalypt forests in order to minimise losses caused by *Phytophthora* species and *Armillaria luteobubalina*. Over 70 thousand hectares of jarrah (*Eucalyptus marginata*) and karri (*E. diversicolor*) forests were mapped for disease impact. The canker fungus *Cryphonectria cubensis* was again detected in the stump of a recently dead *E. marginata* tree. Canopy decline developed in a stand of *E. wandoo* east of Perth as a result of drought stress, insect foliage damage, and twig and branch cankering associated with infection by species of *Cytospora* and *Botryosphaeria*.

118. No significant problems were reported in managed natural forests in Queensland, New South Wales, Victoria, or South Australia (but see native plant communities, below). There has been less disease attributed to *Phytophthora* in Victoria, although trees killed by drought may have been preconditioned by earlier root disease.

Nurseries:

Conifer species:

Diseases:

119. With the rapidly expanding propagation program of *Pinus* hybrid cutting stock in Queensland (1.5 million per year), a condition has developed in which foliage becomes bright yellow or red, leading in some cases to death. Despite selection many families were affected at Beerburrum Nursery this year. Factors affecting the condition appear to be genetic source and age of hedge plants supplying cuttings, and cutting batch. The problem does not appear to be corrected by fungicide application.

120. In nurseries in Victoria, monitoring for *Phytophthora cinnamomi* continued to receive high priority, in order to contain spread. In one nursery action was taken to alleviate problems caused by a high incidence of nematodes.

121. No significant problems were reported from conifer nurseries in other states.

Eucalyptus* species:**Diseases:***

122. *Cylindrocladium scoparium* (sexual stage, *Calonectria scoparia*) caused shoot blight and mortality in young plants of *Eucalyptus cloeziana* in Beerburrum Nursery in Queensland, following a period of above average rainfall. The problem was controlled by means of fungicide treatment.

123. A leaf spot problem of uncertain cause affected young plants of *Eucalyptus cloeziana* in many nurseries in both southeastern and northern Queensland.

124. *Gloeosporidina moravica* was associated with leaf lesions on *Eucalyptus globulus* seedlings at Perth Nursery in Tasmania.

125. No significant problems were reported from eucalypt nurseries in other states.

Native plant communities:***Diseases:***

126. Leaf blight caused by *Cylindrocladium quinqueseptatum* was detected on coppice shoots of *Eucalyptus drepanophylla* adjacent to a badly affected eucalypt field trial at Lannercost, and on old, naturally growing *E. pellita* trees near Mission Beach, northern Queensland.

127. There has been no evidence that dieback within isolated stands of native forest in Victoria is associated with fungal pathogens (the problems appear to be caused by an interaction between bell minors and psyllids, and by possum browsing, respectively). Trees damaged by fungi have become public hazards in parks in native vegetation in Victoria (*Armillaria luteobubalina*, Dandenong Ranges; branch cankering on *Eucalyptus pauciflora*, Alpine National Park).

128. In southeastern South Australia and adjacent northwestern Victoria the condition known as Mundulla Yellows continued to cause disease and death along roadsides and in shelterbelts and revegetation areas. Characteristic symptoms of leaf yellowing and gradual dieback were observed on eucalypts and other native trees and shrubs, but have not been observed within native forests. The cause may be a phytoplasmid which has been isolated from diseased trees.

129. A shoot dieback disease of the endemic conifer *Diselma archeri*, accompanied by root lesions and basal stem and branch cankers yielding a species of *Pseudophacidium*, was found at four sites within national parks in central Tasmania.

130. *Phytophthora* species continued to be active in native plant communities in Western Australia. Aerial and ground spraying of phosphite was conducted in affected areas, particularly where a rare *Banksia* and other plants are threatened (Stirling Range, coastal sites near Albany, Ellis Brook Reserve near Armadale, Popanyinning, Forest heritage Centre at Dwellingup).

Urban and rural:***Pests:***

131. In Victoria, damage by xyloctid wood moths was observed in a small stand of *Salix* outside of Melbourne. The damage observed was minor in nature and confined to isolated trees. Observations will continue to monitor wood moth populations.

Diseases:

132. The Dutch elm disease fungus (*Ophistoma novo-ulmi*) was not detected during surveys of garden and street elm trees in Melbourne (similar symptoms were attributed to possum and elm bark beetle damage). A draft contingency plan has been developed for the potential incursion of the disease.

133. Cypress canker disease (*Seiridium*) was active in cypress shelterbelts in parts of Victoria.

134. The root disease problem in the Tasmanian Botanical Gardens caused by *Armillaria luteobubalina* has not progressed since soil and roots were removed from the main infection centres two years ago. A hazardous *Eucalyptus globulus* trees in Hobart was removed by the local council because of extensive decay caused by *Phellinus robustus*.

135. There were no significant or unusual reports from other states.

NEW ZEALAND

136. In the year from 1 July 1998 to 30 June 1999, records of disorders of forest trees totalled in excess of seven thousand, slightly fewer than those in the previous year. Dry conditions during the summer, especially in eastern parts of the country, prolonged the effects of drought experienced during the previous year, though substantial rain fell towards the west during October. With substantial general rain in autumn (March and April), dry conditions eased, and some parts of the country were affected by stormy weather. The mild winter may have been responsible for an increase in foliage diseases in *Pinus radiata* stands in some areas.

Plantations:***Pinus radiata:******Pests:***

137. *Essigella californica* (Aphididae), which was first found in New Zealand in February 1998, is now found throughout the North Island and in Canterbury in the South Island but is generally not associated with any visible damage other than minor spotting on the needles and numbers are generally low. However in May very high populations on *Pinus radiata* were reported at two small forests in the southern North Island and were associated with needle cast. *Cyclaneusma* needle cast was also common in the stands so the role of the aphid was unclear. The situation is being monitored.

138. A dry, mild winter in 1998 resulted in high *Pineus* spp. (Adelgidae) populations, particularly in Canterbury in the South Island. A drier than usual summer has helped maintain these populations at a high level.

139. Damage by the introduced possum (*Trichosurus vulpecula*) was recorded on 593 occasions, slightly fewer than in the previous year. Most records were from the central and eastern North Island, Coromandel, and Wanganui regions. There was one report of damage by the native parrot, kaka (*Nestor meridionalis*), from Whirinaki in the central North Island.

Diseases:

Foliage

140. There were 742 records of *Dothistroma pini* needle blight, significantly greater than in the previous year, following a warmer than usual winter. Greatest numbers were from the central North Island, the northern west coast of the South Island, and Southland. High disease levels occurred between August and January, initially on the western side of the country which had suffered less from dry conditions. Control spraying was also carried out north of Auckland, where localised infection centres were again appearing in May and June.

141. *Cyclaneusma minus* needle cast records were substantially greater in number (844) than in the previous year. Highest numbers came from the central North Island and northern South Island, and there were also reports between July and November on the South Island West Coast and Taranaki, on the western side of the country, and in the southern North Island, and southern and eastern South Island. Early symptom expression hindered the pre-aerial spraying surveys for *Dothistroma pini* incidence in some forests.

142. In addition, severe defoliation occurred during late winter and spring, 1998 (August-December), in five- to 24-year-old stands of *P. radiata* in parts of the western North and South Islands, and in the northern and central North Island, following prolonged rainfall and unseasonably warm temperatures. Crowns appeared red-brown and where most severe, complete defoliation occurred. Black fungal fruit bodies produced on khaki-coloured bands on affected needles belonged to common litter-decomposing fungi such as *Strasseria geniculata*, *Strasseria* sp., *Lophodermium conigenum*, *L. pinastri*, *Ceuthospora* sp., *Pestalotiopsis* sp., and *Phomopsis strobi*. This disease was attributed to primary infection by *Cyclaneusma minus*, which occurs during autumn and winter, followed by a greater than usual invasion of secondary fungi due to the mild conditions. Trees with thin crowns were still noticeable as late as February, and an effect on growth increment is likely in worst affected stands. It was anticipated that trees would recover when rainfall patterns returned to normal. However, in at least one severely defoliated stand, dieback subsequently occurred as a result of invasion by *Sphaeropsis sapinea* (synonym, *Diplodia pinea*). New outbreaks were reported in some stands north of Auckland during May and June, but it remains to be seen if the problem will recur in the coming year.

143. The condition known as upper mid-crown yellowing, attributed to a magnesium and potassium nutrient imbalance, was less in evidence this year, with a total of 487

records. These were mainly from the central North Island, Gisborne on the North Island east coast, and the northern and southern South Island.

Stems, shoots:

144. Reports of Diplodia dieback (*Sphaeropsis sapinea*) totalled 209, with most records being from the central and eastern North Island and northern Canterbury. Some Diplodia dieback was induced by drought stress, and two records from the Wellington and Wairarapa regions were related to storm damage.

Roots:

145. Records of Armillaria root disease (*Armillaria novae-zelandiae* and *A. limonea*) numbered 443, about the same as last year, most being from the central North Island, and the northern and southern South Island. Most records were of low-incidence mortality in young stands, since chronic infection is not readily identified during surveys. There was a report of a "G.B. fungus" root disease centre (*Dextrinocystidium sacratum*; synonym, *Peniophora sacrata*) at Cable Bay, Nelson. Pockets of mortality in Marlborough were attributed to *Leptographium* and *Phytophthora*.

Other:

146. Drought again affected many stands, already stressed from dry conditions during the previous summer, particularly in the eastern parts of the country during spring and summer (from September on). By February, conditions were also very dry in the west, north, and south of the South Island. In Canterbury (eastern South Island), warm northwesterly foehn winds prior to Christmas resulted in localised high mortality in some two- to five-year-old *P. radiata* stands on silty or sandy soils. Other stands with limited spring growth coped with these conditions, but continuing soil drying led to defoliation and leader dieback in February associated with infection by *Sphaeropsis sapinea*. Mortality also occurred particularly in younger stands on lighter soils. Boron deficiency symptoms were also more prevalent on two- to four-year old trees, apparently enhanced by the dry conditions. Apart from mortality, a high incidence of dieback and multiple leaders in surviving trees will affect thinning selection and top log quality.

147. In addition to the upper mid-crown yellowing syndrome (see above), other nutrient deficiency disorders were reported, mainly from the central North Island and Nelson, including those of phosphorus, magnesium, and boron (also east coast North Island).

148. Frost caused shoot tips to droop in August after premature mild conditions in one central North Island forest, and terminal hypertrophy and needle shedding in another forest during September was attributed to weather and site conditions possibly affecting particular clones.

149. Stormy weather in February caused damage to mature pine trees north of Auckland. Heavy rainfall in spring and summer appears to have been the cause of localised group mortality associated with waterlogged sand above a clay pan in a far

northern coastal dune forest.

Douglas fir (*Pseudotsuga menziesii*):

Diseases

150. Records of Swiss needle cast disease (*Phaeocryptopus gaeumannii*) totalled 49 during the past year. Douglas fir planted on a site previously stocked in *Pinus radiata* heavily affected by Armillaria root disease in the southwestern South Island was reported to be showing no mortality.

151. Younger age classes of Douglas fir suffered during dry, windy conditions in spring and early summer on the Canterbury plains (eastern South island). Many seedlings and saplings were reported dead in September after foliage had turned a red-brown colour. Drought also affected an overstocked stand of Douglas fir in Southland. Branch and leader dieback was reported on Douglas fir in the Clyde area in the South Island.

***Eucalyptus* species:**

Pests:

152. During the summer of 1998/99 a survey of eulophid galls on *Eucalyptus* spp. was carried out. The following is a summary of what was found.

153. *Ophelimus eucalypti* (Eulophidae), which has been present in New Zealand since the 1920s, is distributed throughout the country and is commonly reared from *E. globulus*, *E. nitens* and *E. viminalis*. It is still uncertain whether the specimens from the midrib and branch galls, and the small sandpaper type galls on juvenile leaves of these hosts are all the same species. This is still under investigation.

154. Another species of *Ophelimus* (designated sp. b) is distributed throughout New Zealand on *E. saligna*, *E. botryoides*, *E. grandis* and *E. deanii*. *Eucalyptus grandis* leaves which have been subjected to heavy ovipositing tend to be shed earlier and often the only galls that develop are very small, giving the galled leaf a quite different appearance to those of galled *E. saligna* and *E. botryoides*. The adults that emerge from these small galls are almost always males. This may suggest that *E. grandis* leaves often do not support female development (with their probable greater nutritional requirements) through to pupation and emergence. This hypothesis is currently under investigation.

155. The survey has also resulted in the recognition of at least two more species of Eulophidae. The most abundant species, a distinct yellow and black *Aprostocetus* species has emerged from stem and leaf galls of *E. globulus* (Northland to Wellington), from *E. globulus* sandpaper galls (Marlborough), from *E. kitsoniana* galls (Wellington), from *E. grandis* leaf galls (Wellington), and *E. saligna* and *E. botryoides* leaf galls (throughout the North Island). This distribution combined with the known biology of other *Aprostocetus* species strongly suggests that it is parasitic on all gall-forming *Ophelimus* species found in New Zealand.

156. Another eulophid, a metallic looking *Chrysonotomyia* species, has been collected from leaf galls of *E. grandis*, *E. saligna* and *E. botryoides* (throughout North Island). It is probable that this species is also a parasitoid of *Ophelimus* sp. b.

157. Plans for the next year include determining the parasitism status of *Aprostrocetus* and *Chrysonotomyia*, describing the gall induction mechanism of *Ophelimus* sp. b, and using morphological and molecular techniques to elucidate the species of *Ophelimus* present in New Zealand.

158. During a routine port environs survey in January 1999 *Acrocercops laciniella* (Gracillariidae) (the blackbutt leafminer) was found in New Zealand for the first time. It was found on *Eucalyptus leucoxydon* at the Aviation Golf course adjacent to the Auckland International Airport. Further surveys revealed that it is reasonably widespread in Auckland. Other hosts recorded in Auckland were *E. viminalis*, *E. macurthurii* and *E. botryoides*. Eradication was not considered a feasible option.

159. In Australia *Acrocercops laciniella* is widespread from southern Queensland to Tasmania. Its main host is believed to be *E. pilularis*, and it has periodically caused severe damage to *E. pilularis*, particularly between July and September, in coastal NSW¹. The insect attacks both mature and coppice foliage destroying all green tissue in the leaves, causing them to curl and giving the tree a burnt appearance. The damaged trees regrew their foliage within three months and appeared to recover. *A. laciniella* has also been commonly reared from mines on *Angophora floribunda*, *A. costata*, and *E. saligna*. In Tasmania it is common on the juvenile foliage of *E. nitens*, *E. globulus*, *E. regnans*, and *E. obliqua*. More recent host records from eastern Australia include: *E. viminalis*, *E. acmenoides*, *E. dives*, *E. bridgesiana*, *E. rossii*, *E. globulus* ssp. *pseudoglobulus*, and *E. macrorhyncha*.

160. In Australia a number of parasitoids of *Acrocercops laciniella*, including Braconid and chalcidoid wasps, have been reared from its leaf mines. *Acrocercops alysidota* has been in New Zealand since about 1916 (on *Acacia melanoxylon*) and is parasitised by the eulophids *Diaulomorpha* sp. and *Cirrospilus* sp. The host range of these parasitoids is currently being investigated.

161. *Cardiaspina fiscella* (first found in New Zealand in May 1996 near Auckland International Airport) continues to expand its range and have a severe effect on its main hosts, *Eucalyptus saligna* and *E. botryoides*. It has now spread as far north as Whangarei and east to the coastal Bay of Plenty. There is a single record on *E. camaldulensis* in Whangarei. An apparently effective parasitoid has been indentified in New South Wales and permission has been received to import it into quarantine in New Zealand.

162. *Uraba lugens* (Nolidae) (first found June 1997) is still apparently confined to a very small area at Mt Maunganui. The last time larvae were seen was in January 1999. Further intensive surveys are planned for spring this year.

¹For references to statements in this section see Annex A (P.68, 69)

Diseases

163. As in previous years, a high number of leaf spot fungi were recorded on eucalypt species throughout the year. These included *Aulographina eucalypti* (40 records), *Fairmaniella leprosa*, *Mycosphaerella* species (particularly *M. cryptica*), *Pachysacca pusilla*, *Pseudocercospora eucalyptorum*, *Septoria pulcherrima* (synonyms, *Kirramyces eucalypti*, *Phaeophleospora eucalypti*), and *Sonderhenia eucalyptorum*. In most cases these fungi had limited host impact, but *S. pulcherrima* continued to cause a severe leaf cast disease of *Eucalyptus nitens* in the coastal Bay of Plenty region, and was also damaging in Northland, and *Aulographina eucalypti* and *Trimastroma bifarrum* were associated with defoliation of *E. regnans* and *E. fastigata* in the central North Island following wet weather.

164. Two species of *Mycosphaerella* new to New Zealand were recorded on *E. saligna* in the eastern Bay of Plenty region, and on *E. muelleriana* in Northland, respectively (that on *E. saligna* may have been previously recorded in 1983). The identities of these fungi are being determined (see Paragraph 208).

165. Substantial cankering and dieback developed in a South Island West Coast stand of *Eucalyptus nitens*, this year, following the discovery of the problem in 1998. Trees are 14- to 19-years-old, and the area affected encompasses 60 ha. A species of *Sarcostroma* which is consistently associated with the cankers was first found in the central North Island in 1986, and has also been recorded from Nelson. No damage was present on adjacent *E. regnans* and *E. obliqua* trees.

166. Dieback and mortality losses occurred in stands of *Eucalyptus* and *Acacia* species (particularly *E. nitens*) exposed to warm dry winds during drought conditions in Canterbury (eastern South Island) early in summer. Dieback in spring of various eucalypt species (*E. grandis*, *E. delegatensis*, *E. botryoides*, and *E. saligna*) in Wainuiomata and along the Hutt River (Wellington area), possibly due to increased wind exposure, was associated with *Platypus* attack and a *Cytospora* species. In many cases leaves were still present, indicating rapid death.

Acacias:

Pests

167. In late May 1999 a well established population of the painted apple moth (*Teia anartoides* (Lymantriidae)) was found in the suburb of Glendene, Auckland. It was found by a member of the public. The Ministry of Agriculture and Forestry immediately initiated a delimiting survey to assess the extent of the population. The moth is apparently confined to an area with a radius of about 700 m. *Acacia* spp. are the principal hosts but the caterpillars feed on a wide range of plants including *Pinus radiata*. This is regarded as a very serious incursion and the population is the target of an eradication attempt using ground-based spraying and tree removal. There is much debate in New Zealand about the extent of the areas surveyed and the fact that aerial spraying is not being used in the eradication programme.

168. *Dicranosterna semipunctata* (Chrysomelidae) which was first found in New Zealand (Auckland) in April 1996 has extended its range to Orewa in the north and

also in the south to northern Waikato. As a result of a pest risk analysis of *D. semipunctata* on *Acacia melanoxylon* it has been decided to explore the possibility of introducing parasitoids from Australia. Initially this work will centre around Armidale, NSW.

Cypresses:

Diseases

169. Young stands of *Chamaecyparis lawsoniana* established in a number of locations showed shoot tip death associated with a species of *Sarcostroma*. There was some concern that the problem may lead to bushiness and a loss of apical dominance.

Nurseries:

Diseases

170. As occurred last year, a number of forest nurseries were not inspected for economic reasons. Few problems were reported in those examined.

171. Swellings produced at the base of *Pinus radiata* seedlings in a central North Island nursery have been attributed to a chemical cause. Root rot associated with infection by *Fusarium* and *Phytophthora* occurred in a nursery near Nelson.

Urban and rural:

Pests

172. In April 1999 during a routine port environs survey in Auckland a leaf-mining caterpillar was found on *Banksia integrifolia*. This was the first record of a leaf-miner on *Banksia* in New Zealand. Samples were reared and the moth subsequently identified as *Stegommata sulfuratella* (Lyonetiidae). Further searches have shown that although not very numerous, the species is quite widespread in Auckland and eradication was not considered an option. Because of its hardiness and salt-tolerance *B. integrifolia* is a valued amenity tree in New Zealand. Its yellow flowers are also a valuable nectar source for many native New Zealand birds such as tuis and bellbirds.

173. The eradication campaign for Dutch elm disease in Auckland continued during the 1998-99 season. The causal fungus, *Ophiostoma novo-ulmi* was not isolated from 14.5 thousand *Scolytus multistriatus* beetles pheromone trapped between October and April (for further details, see Paragraph 179). Over the last three seasons only two of 21.2 thousand trapped beetles have yielded cultures of *O. novo-ulmi*. The number of beetles trapped this year is a considerable increase on the 4.25 thousand beetles caught the previous season.

Diseases

178. The mild winter upset the timing of leaf shedding and new bud production on some deciduous trees this year.

179. The programme to eradicate Dutch elm disease in Auckland continued during the

1998-99 season (see also Paragraph 177). No trees exhibiting symptoms of Dutch elm disease were found in three surveys of all known elms in Auckland. One tree (which died because of severe root disturbance) yielded *Ophiostoma novo-ulmi* from four-year-old wood (ie. the infection was contained). This prompted a study involving the sampling of branch material from nearly 100 elms. Cultures were attempted from any stained wood found in the branches, but no *O. novo-ulmi* was isolated. Infection has therefore not been found in current year's wood since the 1995-96 season. A far bigger survey for contained (or asymptomatic) infection is planned for the coming season. Further attempts were made to poison coppice elm shoots at the site in Napier where the disease is also present. It was theorised that *O. novo-ulmi* may have been carried to Napier with machines from Auckland used to dig sewer lines. The beetle that vectors the disease is not yet present in the Napier region.

180. Cypress canker disease (species of *Seiridium*) was extensive in rural *Cupressus* woodlots and shelterbelts in warmer localities (eg. around Auckland and Tauranga). A survey has been initiated to assess the incidence of the disease in rural cypress stands of different types throughout the country. One of the cypress canker fungi, *Seiridium unicorne*, was found for the first time on cankered branches of Californian redwood (*Sequoia sempervirens*).

181. The rust fungus *Uromycladium alpinum* was recorded for the first time in New Zealand on *Acacia dealbata* in Gisborne and Northland. However, this fungus may not be newly introduced, and it is thought that damage will not be as severe as that caused by *U. notabile*.

182. A species of *Cryptosporiopsis* was found on dead branches and lesions of *Acer davidii* trees in Central Park, Wellington, and species of *Phoma* and *Phomopsis* were obtained from a specimen of the Australian *Dacrydium franklinii* in the Wellington Botanical Gardens. *Cylindrocladium spathulatum* (possibly synonymous with *C. illicicola*) was identified on box hedges (*Buxux* sp.) in the Auckland area (see Paragraph 207).

183. Dying ornamental puka trees (*Meryta sinclairii*, native to the Three Kings and Hen and Chicken Islands) at Tauranga were found to be growing in heavy, wet clay soils infested with *Phytophthora cactorum*.

184. Armillaria root disease is very common in urban gardens, and was active in the Christchurch Botanic Gardens, this year. Television coverage in April highlighted the problem in the Gardens, and promoted the advocacy of injections of a *Trichoderma* product as a cure. However, there is some scepticism about the effectiveness of this treatment, since rigorous experimental evidence is limited.

185. In December-January strong offshore northeasterly winds caused salt scorching to foliage of a variety of exotic tree species up to 10 km inland in the Bay of Plenty region from Katikati to the Coromandel Peninsula, and in February in the Waipu area of Northland. Drought affected a number of exotic urban trees during summer in eastern parts of the country and in Southland. Damage from waterlogged soil occurred in some shelterbelts of *Pinus radiata* and oak (*Quercus* sp.) in the southern North Island.

Native vegetation:

Diseases

186. Decline in beech (*Nothofagus*) was reported in the Cashmere area (Canterbury) in October, and beech dieback associated with stem boring and fungal leaf spotting was observed near Kawatiri Junction in March-April. Crown dieback occurred in some pohutukawa trees (*Metrosideros excelsa*) near Napier, and some old totara trees (*Podocarpus totara*) showed dieback in localities in Northland (a species of *Pestalotiopsis* was isolated).

187. Some new records included a species of *Mycosphaerella* on leaves of rangiora (*Brachyglottis repanda*), and a species of *Fusarium* from *Phyllocladus glaucus* in the Otari Plant museum, Wellington. Unexplained distortion of tree fern fronds (*Cyathea* sp.) was also reported this year.

188. There was speculation late in 1998 that the phytoplasma causing flax yellow disease in *Phormium tenax* has spread to other native plants such as cabbage tree (*Cordyline australis*), where it is responsible for the recent decline. Much more evidence is needed.

QUARANTINE

Australia:

Pests:

189. In Queensland, a six-month Asian Gypsy Moth trapping program around the Port of Brisbane, airport and surrounding suburbs has been completed. No AGM were trapped.

190. There were three serious incursions into Queensland this year of exotic insect pests which required eradication action. The powder post beetle *Lyctus africanus* was found infesting window surrounds in a newly constructed house at Bowen. The timber was imported. The house was fumigated by AQIS. Another exotic powder post beetle *Minthea reticulata* infested flooring in a house at Cairns. In this case the timber was local but cross infestation at the mill from imported exotic ply and timber is suspected. Following surveys of other mills around Cairns, the house was fumigated at the expense of AQIS and DPI Forest Industries Development. The third case involved the Western Drywood Termite *Incisitermes minor* in a boat in Manly boat harbour in Brisbane. The boat had been imported via container from the USA and was fumigated at the owner's expense.

191. Other post barrier discoveries of interest in Queensland included the giant bostrychid *Apate* sp. in a wooden artifact from Africa and the bostrychid *Heterobostrychus hamatipennis* in bamboo items from China.

192. In Victoria, surveys have been conducted over summer 1998-99 in the ports of Melbourne, Geelong and Westernport to detect Asian Gypsy Moth (*Lymantria*

dispar), a major potential threat to the forest industry in this state. No moths were detected during the course of the survey work.

193. Surveys were also conducted in Tasmania (Forestry Tasmania) to detect Asian Gypsy Moth (*Lymantria dispar*) and Monterey pine aphid (*Essigella californica*). Neither species was detected. Surveys of high risk planting's of both *Pinus* spp. and *Eucalyptus* spp. near ports and container depots will be conducted to detect the establishment or incursion of any exotic pests or diseases.

Diseases:

194. Microscopic examination and DNA analysis indicated that galls discovered in young *Pinus radiata* plantations in northeastern Tasmania were unlikely to be caused by the western gall rust fungus (*Endocronartium harknessii*; see Paragraph 37). Outcomes from a meeting of the Forest Health Committee included a decision to request *Pinus radiata* growers to inspect their plantations for similar disease symptoms, and the development of a protocol to provide a rapid diagnosis for western gall rust disease. Symptoms of this disorder were not found during surveys undertaken in New South Wales.

195. Isolations for the pine pitch canker disease fungus (*Fusarium circinatum*) were made from samples taken throughout New South Wales and A.C.T. from *Pinus radiata* trees with dead tops, resinous stem and branch cankers, and from dead naturally regenerated plants. No *F. circinatum* was isolated, and most fungi cultured were of *Sphaeropsis sapinea*.

196. AQIS has changed the conditions for importing seed of pine and Douglas fir into Australia. Copies of the new protocol were distributed to all forest health research working group members. The new conditions require the imported seed to be accompanied by a phytosanitary certificate stating the seed has been inspected and found free of *Fusarium circinatum* (agent of pine pitch canker disease), is not from an area where the pathogen is known to occur, and has been given a specified heat treatment.

New Zealand:

Pests:

197. New introductions are listed in the disease status section (Paragraphs 158, 167, 172). See also following section.

Diseases:

198. **Interceptions:** For the year ending 30 June 1999 some 111 quarantine samples were received from the Ministry of Agriculture and Forestry (MAF) quarantine inspectors. The source of these samples were - from used vehicles 34%, debris in or on containers 30%, wood packaging 16%, used machinery 4%, timber 7%, dunnage 1%, debris 0%, and miscellaneous 10%. The geographic area of origin of these samples were - Asia North 40%, Asia South-east 7%, Asia South-west 2%,

Australasia 26%, Pacific 3%, North America 8%, Europe 9%, Africa 1%, South America 1%, and unknown 5%.

199. The total number of samples received in 1997-98 of 195 was significantly down on the 459 received in 1996-97. This was accounted for by the winding up of the used car import survey in late 1997. The number of container samples was also down on the 58 samples received in 1996-97 due to a container survey undertaken that year. However, the number of samples continued to decline from 195 last year to 111 this year (1998-99). This could reflect an increase in vigilance on the part of the exporters but it is more likely that the restructuring of the Ministry of Agriculture and Forestry has disrupted continuity of collecting and may have demoralised staff.

200. **Forest Research Quarantine Facility:** *Forest Research's* new quarantine building was opened by Hon John Luxton, Minister for Biosecurity, on 13 May. The state-of-the-art facility was built to comply with the new MAF standards for Plant Quarantine Diagnostic Laboratories and Operators and for Invertebrate rearing facilities. At this time the *Forest Research* facility is the only one in the country to have been registered under the Plant Quarantine Diagnostic Laboratories standard.

The facility will provide two main services:

- In the Plant Pest Diagnostic Laboratory, staff will identify insect and fungal pathogens that have been intercepted at our borders.
- Invertebrate Quarantine and Containment rooms will be used to rear pests and biological control agents in containment.

Thus *Forest Research* will be able to continue to identify potential forest pests, assess the risk they pose, determine their potential geographical range and host preferences, rear intercepted pests under extremely secure conditions to support the development of control options, and rear and test natural enemies of any pest that has gained a foothold here.

201. **Significance to Forestry Quarantine of Contaminants on the External Surfaces of Shipping Containers:** A sample, comprising 3681 shipping containers, were selected randomly from containers landed at the ports of Auckland, Wellington and Lyttelton between September 1997 and May 1998. Each container was placed on a frame and all six sides were examined for the presence of soil, plant, animal or inorganic matter. Isolations for fungi were made from soil samples from 1150 containers, and nematodes and other soil animals were extracted from 347 soil samples. All plant material was examined for the presence of pathogens. Any insects, spiders and other animals were identified as far as possible and their pest status determined. A container was classified as 'quarantinable' if any of the contaminants found included viable animals or fungi belonging to genera which include plant pathogens or parasites. Of the 3681 containers examined, 61% carried no contaminants, 16% carried non-quarantinable contaminants and 23% carried quarantinable contaminants. Among the quarantinable contaminants were pathogenic species of *Fusarium* and egg masses of the gypsy moth (*Lymantria dispar*). The quarantinable contamination rate varied from region to region, for example, it was 14% for containers originating from Korea, Taiwan and Japan, 21% for Northern Europe, 21% for North America, 28% for Australia, 33% for South-east Asia, 48% for the Pacific Islands and 50% for South Africa. There were no regional differences in

the proportion of quarantinable contaminants to the total member of contaminants and no differences in the quarantinable contamination rate were found for different cargo types or for different container types. The study concluded that the nature and the frequency of occurrence of contaminants on the external surfaces of shipping containers represent a substantial risk to forestry in New Zealand.

202. Pitch Canker and Seed Import Regulations: In March of this year two new import health standards for *Pinus radiata* and *Pseudotsuga menziesii* seed were released for comment by the Ministry of Agriculture and Forestry. These standards include considerable input from *Forest Research* and contain a list of countries and states which are considered to be free of pitch canker (*Fusarium circinatum*; synonym: *F. subglutinans* f. sp. *pini*). Importations from the listed countries and states will require an import permit, a phytosanitary certificate confirming the disease free status of the exporting country, and fungicidal treatment. Importation from countries and states not listed will be required to be grown for one season in a high security quarantine facility. This is only commonsense, and importers of seed should be sourcing seed from reputable seed merchants who can prove that their seed is from disease free areas. On the down side the import health standards are all-encompassing documents which included directives on pests, diseases and weed seed contaminants, resulting in twenty-one pages of MAF-speak to wade through.

203. Dutch Elm Disease: See Paragraphs 173, 179.

204. Risk Associated with Air Cargo and Air Containers: Air cargo is a pathway by which exotic insects and fungi can enter New Zealand. For example, *Phylacteophaga froggatti* (eucalyptus sawfly), *Cardiaspina fiscella*, and several eucalyptus leaf spot fungi were first detected in the Auckland airport environs. These organisms very probably entered the country on plant debris associated with air cargo.

205. A study funded by MAF to determine the forestry quarantine risk associated with air containers, and their contents, by inspecting randomly selected containers is under way. Stage one of the study was to conduct a pilot survey at Auckland airport, its outcome will determine how many containers need to be sampled in a full survey to provide statistically valid results and this has now been completed. Of the 102 containers examined for items of quarantine significance 30% contained contaminants. In nearly all cases the contaminant, soil and debris, were on the container surface, or loose inside the container, rather than carried with the cargo. Both *Phytophthora* and *Ophiostoma* species were isolated from contaminating soil samples. Based on the pilot a full study of 1000 containers from Auckland, Wellington and Christchurch airports has commenced.

206. Western Gall Rust: The recent western gall rust scare in Tasmania gave *Forest Research* the opportunity to see how such an incursion would be recognised and responded to. In anticipation of such an incursion occurring in New Zealand a resource document had been compiled in 1996. It was gratifying to see that the Tasmanians followed a similar path to that outlined in this document. At the time of writing the New Zealand document identification using DNA technology was not considered appropriate as the basic knowledge and expertise were lacking. It was also felt that as the work had to be done overseas this would put it out of our control. In

the last three years the expertise has been developed in the USA. However, the Tasmanian experience justified our conclusion and control was lost especially in dealing with the USDA to obtain entry permits for material into the USA. At present *Forest Research* is developing DNA technology to aid in the identification of *Fusarium circinatum* (synonym *F. subglutinans* f. sp. *pini*) and this will be extended to cover other overseas pathogens in the future.

New Introductions:

207. *Calonectria spathulata* - A leaf and stem blight on box hedges was observed in several parts of Auckland in the autumn-winter of 1998. The fungus was identified, on the basis of a *Cylindrocladium* asexual stage, as *Calonectria spathulata* (anamorph *Cylindrocladium spathulatum*) by the MAF Plant Protection Centre. Apparently only cosmetic damage was done to the box plants. This fungus was only known from Brazil and MAF could only speculate whether it was a native recently adapted to box or an incursion. *Cylindrocladium* is an extremely difficult genus and inquiries in Brazil indicate that there is a great deal of scepticism there as to whether this is indeed a real species. Correspondence indicates that *C. spathulatum* may be the same as the more common *C. ilicicola* which has a much wider distribution and host range (including *Buxus* sp.). This fungus was considered to be of concern to forestry as it is a pathogen of eucalypts in Brazil.

208. *Mycosphaerella* sp. - A *Mycosphaerella* was found in late 1998 on samples of *E. saligna* from forests in the eastern Bay of Plenty and from one forest in Northland (see Paragraph 164). It was first collected from 1 to 2-year-old trees on leaves also affected with other foliar pathogens, and subsequently found on suppressed leaves of mature trees. This species does not exactly match any of the described species of *Mycosphaerella* on eucalypts. It is possible that some of the current species descriptions are too narrow at present and that, with expansion of the species concepts, it will find a slot among those already already described.

FOREST HEALTH SURVEILLANCE AND DIAGNOSIS

Australia:

209. In Queensland, forest health surveys were conducted in all State-administered, and most private plantations of both hardwoods and softwoods in 1998-9. New initiatives for 1999-2000 include a major health monitoring programme for native forests, increased intensity of port and airport environs surveys, and intensive surveys of selected native forests near high risk ports. Methodology is being adapted to suit requirements imposed by this broadening of the scope of health surveillance.

210. Forest health surveillance in New South Wales continued in both the hardwood and softwood plantations throughout the state in 1998-99. Aerial surveillance (by helicopter) was trialed in the larger (>500 ha) eucalypt plantations to examine the usefulness of this method for determining extent and severity of disorders in these young plantations (2-5-year-old). This method proved useful in identifying problem areas and stratifying the ground survey, thus reducing time spent doing ground surveys. The surveillance methodology for softwoods plantations changed slightly for

1999, with less reliance and time spent on “drive-through” surveys, and more “targeted” ground surveys, concentrating on younger age-classes. The Forest Health Survey Unit included among other duties, surveillance of *Pinus radiata* plantations for Dothistroma needle blight, Diplodia dieback disease, and Cyclaneusma needle cast. Sampling was also undertaken throughout the state for the pine pitch canker disease fungus (*Fusarium circinatum*; see Paragraph 195), and inspections were carried out for gall symptoms in *Pinus radiata* stands, similar to those detected in Tasmania (see Paragraphs 37, 194).

211. In Tasmania, North Forest Products (NFP) is responsible for the management of 47,000 ha of eucalypt tree farms (ETF) and 5,000 ha of *Pinus radiata* tree farms (PTF). Several forest insect pest outbreaks capable of causing economic injury occurred during the past 12 months and a total of 714 ha was treated with insecticide. About 40,000 ha of ETF were monitored for insect pests and a number of incipient outbreaks encountered. An integrated pest management approach was adopted which involved monitoring of natural predator populations and changes in climatic conditions, and as a result treatment of only 1.37% of the estate with synthetic insecticides was undertaken.

212. North Eucalypt Technologies (NET) continued to undertake forest health surveillance in North Forest Products owned and joint-venture eucalypt tree farms. Aerial surveys covering approximately 3,629ha and ground-based surveys covering approximately 3,077ha were undertaken in *E. globulus* and *E. nitens* ETF aged from 0.5 to 11 years. The main insect pest symptoms detected were due to chrysomelids, autumn gum moth, gum-leaf skeletoniser, *Gonipterus* weevil, *Heteronyx* cockchafers and *Hesthesis* borer. A number of new leaf pathogenic fungi were detected and identified by Dr Zi Qing Yuan (University of Tasmania).

213. A disease assessment survey of plantations of *Eucalyptus globulus* is currently underway in southern Western Australia supported by Murdoch University and industry collaborative funding.

214. A number of urban and rural disease samples from government bodies and private individuals were dealt with at Queensland Forestry Research Institute during the past year.

215. The Vegetation Health Service in Western Australia (Department of Conservation and Land Management) processed 2112 samples for *Phytophthora* identification during the past year. Of these, 827 were positive for *Phytophthora*, mainly *P. cinnamomi*. An additional 33 samples (including *Santalum*, *Pinus* and *Eucalyptus*) were subjected to general diagnosis.

New Zealand:

216. The Forest Health Surveillance Unit, now known as the Forest Health Advisory Services, was purchased from the Ministry of Agriculture and Forestry, and is now a discrete self-contained entity within *Forest Research*. Thus, after an absence of more than ten years, forest health surveillance has once again come within the jurisdiction of the old Forest Research Institute. This year Forest Health Advisors carried out

surveillance in indigenous forests under a contract with the Department of Conservation, besides their more traditional role in exotic pine forests.

FOREST PRODUCTS

West Indian Drywood Termite (Cryptotermes brevis), Queensland

217. Six buildings in Brisbane, three in Maryborough, one in Capricornia and two in the Sunshine Coast hinterland were fumigated in 1998-99 to eradicate infestations of this pest. A further 13 buildings in Brisbane and five buildings in Maryborough were discovered infested during recent surveys and require fumigation. Of particular interest is immanent fumigation of the Industrial Pavilion and associated horse stables, Royal National Association (RNA) in Brisbane due to occur in September 1999. A halfway house for psychiatric patients is also to be fumigated this year. The fumigation will involve relocating 32 residents and 20 carers.

Subterranean termites, Queensland

218. *Termite management systems:* Much time is devoted to fee-for-service consultancy work for industry, testing novel termite management systems. This work is confidential.

219. *Termite Standards:* It is a requirement of the *Queensland Building Act 1975* that buildings in Queensland be constructed in accordance with the provisions of the Building Code of Australia (BCA). These provisions specify that all susceptible structural members of buildings be protected from damage by subterranean termites. If the materials and construction comply with Australian Standard AS 3660.1, the requirements of the BCA and the *Queensland Building Act 1975* are satisfied. The use of other methods that will prevent damage to buildings by termites is also permitted in the Act. The decision to accept these preventative methods that are not nominated in AS 3660.1, is at the discretion of each local Council.

220. Committee BD/74 - Termite Control was reconstituted to re-draft the Standard to be a performance-based document and include a set of performance criteria for the assessment of novel products. Drafts of the Termite management trilogy: AS3660.1 (Part 1: New building work), AS3660.2 (Part 2: In and around existing buildings and structures) and AS3660.3 (Part 3: Assessment criteria for termite management systems) are progressing through the Public Comment phase. In excess of 857 Public Comments were received for AS3660.1. Fewer comments were received for AS3660.3. AS3660.1

RESEARCH AND DEVELOPMENT - DISEASES - AUSTRALIA

221. The following catalogue summarises research studies or other activities itemised in the respective state and organisation disease reports (Annex A). Because not all submissions have included such projects the list cannot be taken as representative of current forest pathology research in Australasia. However, it does provide a useful summary of activities being undertaken in some parts of the region. Presentation is by state and organisation. Pest research studies are listed within the general text, from

which they have not been separated out.

222. Queensland (Queensland Forestry Research Institute, Queensland Department of Primary Industries):

- A trial at Gambubal Forest evaluating genetic sources of *Pinus radiata* potentially resistant to *Dothistroma* needle blight: discontinued due to lack of funding.
- Studies to determine the efficacy of "Phytoclean" as a replacement for formalin to control *Phytophthora* in foot and wheel baths at Toolara quarantine nursery: completed; "Phytoclean" is suitable for disinfecting boots and equipment in baths, providing thick mud and plant material is first removed.
- Root disease observation plots in second rotation plantations up to six-years-old in southern Queensland (Amamoor, Jimna, Yaraman): mortality losses after one and two years ranged up 7% per year.
- Laboratory studies with *Cylindrocladium quinqueseptatum*: many species of eucalypt (including *Corymbia*) are susceptible.

223. Victoria (Centre for Forest Tree technology, Department of Natural resources and Environment):

- Glasshouse inoculations of *Eucalyptus nitens* with *Ramularia* sp. isolated from lesions associated with alcoholic flux symptoms: only small lesions and no flux were produced.
- Trial to evaluate the use of *Trichoderma* to control nursery diseases: continuing.
- Study to assess the influence of salt in predisposing nursery seedlings to attack by *Phytophthora cinnamomi*: continuing.

224. South Australia (Waite Complex, Adelaide):

- Identification of a phytoplasmid associated with the Mundulla Yellows syndrome: continuing.

225. Tasmania (Forest Research and Development, Forestry Tasmania):

- Inoculation studies using a species of *Cryptosporiopsis* isolated from young, dying *Eucalyptus nitens* trees: necrotic lesions were produced on inoculated seedlings.

226. Western Australia (Department of Conservation and Land management, Murdoch University, Curtin University, Minerals and Energy Research Institute of Western Australia, Alcoa of Australia, CSIRO):

- A shoot dieback disease of *Pinus pinaster* associated with infection by *Sydowia (Sclerophoma)* and *Aureobasidion*: monitoring the effect on stem form.
- Diseases in *E. globulus* plantations: interaction between *Endothia gyrosa* canker development and micronutrient status; interaction between copper deficiency and disease; *Mycosphaerella* leaf pathogens; canker diseases.
- Dieback diseases in *Eucalyptus marginata* (jarrah) and *E. diversicolor* (karri) forests: more than 70 thousand hectares were mapped in the past year.

- *Phytophthora cinnamomi* root disease of *E. marginata*: field trials on diseased forest sites of stock selected for resistance; pilot and production seed orchards; field testing of the first seed orchard progeny.
- *Phytophthora cinnamomi* root disease of *E. marginata*: effect of uptake and distribution of phosphite; early disease development on rehabilitated bauxite mine sites as influenced by waterlogging and drought; long term pathogen survival on rehabilitated bauxite mine sites.
- Armillaria root disease in *E. diversicolor* regrowth stands: a tree-extraction study to determine below-ground infection; preliminary results indicate that above-ground surveys may underestimate infection by up to 15-20%.
- *Armillaria luteobubelina* in the Swan coastal plain and *Eucalyptus wandoo* forest: incompatibility studies between haploid cultures.
- *Phytophthora cinnamomi* in native plant communities: phosphite fungicide control adjacent to mining activity, and on the south coast of Western Australia; tolerance of the pathogen to phosphite fungicide; effects of phosphite on host pollen development, flowering, seed set, and viability; genetics of the pathogen; ectomycorrhizal fungi and induced host resistance).
- Sudden death in cutflower Proteaceae: underway.

EXTENSION LITERATURE - PESTS

227. Sections of the book *Pests of Timber in Queensland*, published in 1996, were used to revise various publications in the Timber Note series. These Timber Notes are on the WorldWideWeb at www.forests.qld.gov.au.

228. A new updated series of eucalypt plantation pest notes has been completed in Victoria, and is currently in the process of being placed on the Departmental website. Another Departmental website has also been developed which will allow treegrowers to obtain information on insect pest and disease species, their lifecycles, mode of attack and possible control measures, likely to be encountered in their locality.

229. A new series of colour leaflets depicting the major insect pest species has been produced in Tasmania (Forestry Tasmania).

ADMINISTRATIVE - NEW ZEALAND

230. The Forest Health Advisory Committee has been renamed the Forest Biosecurity Advisory Committee. Its purpose is to provide a forum for the forest sector to enable discussion of biosecurity services and initiatives, and to provide advice to the Minister of Biosecurity. It also facilitates the contract for surveillance services to commercial forest growers.

231. The Forest Health Research Collaborative met in November and May. This body is open to anyone with an interest in forest health, and facilitates interaction between forest owners and science providers. A prime function of the group is to allocate research funding on relevant topics. Meetings are divided into a business session, a technical session (which may include topical science presentations), and a field trip.

CONCLUSION

232. This report is the Annual Pest, Disease and Quarantine Statement of the Forest Health Research Working Group recording the 12-month state of forest health and quarantine situation in Australia and New Zealand.

RECOMMENDATIONS

233. The Annual Pest, Disease and Quarantine Statement be accepted and noted by the Standing Committee.

FOR INFORMATION

Forest Health Research Working Group
(I. Hood, N. Collett, Secretariat)
3 August 1999

ANNEX A: Forest pest, disease situation and quarantine reports 1998-99 by states and country.

ANNEX A

FOREST PEST, DISEASE AND QUARANTINE SITUATION REPORTS 1998-99 BY STATES AND COUNTRY**1 QUEENSLAND - PESTS**

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Queensland Forestry Research Institute
PO Box 631
Indooroopilly Q 4068

1.2 PESTS OF PINE (EXOTIC)**SIREX WOOD WASP (*Sirex noctilio*)**

Qld (JK)

Queensland remains free of Sirex wood wasp. However the number of trap tree sites has been increased and the programme extended to include plantations at Gambubal near Warwick.

FIVE SPINED BARK BEETLE (*Ips grandicollis*)

Qld (JK)

Ips remains south of the quarantine border at Maryborough. There has been no observed or reported damage by this insect during the past year.

GOLDEN HAired BARK BEETLE (*Hylurgus ligniperda*)

Qld (JK)

This bark beetle was first recorded in *P. radiata* waste at Passchendaele in 1997. It is still active in that area but has not been recorded further north.

MONTEREY PINE APHID (*Essigella californica*)

Qld (JK)

The Monterey pine aphid was found in plantations at Gambubal near Warwick in December, 1998, in the Passchendaele, Mt SugarLoaf (Stanthorpe) and Pechey (near Toowoomba) plantations in January 99 and at Esk in March 99. It has not yet reached the Beerburrum plantations. Monitoring sites have been set up at Pechey and Esk, aphid populations and tree health are recorded monthly. The beerburrum plantations are being inspected regularly.

PINE APHID (*Eulachnus thunbergii*)

Qld (JK)

Eulachnus thunbergii is present in all the plantations. In the areas where *Essigella* is present, *Eulachnus* is found on the same trees, but in greater numbers than *Essigella*. Populations of the aphid will be monitored this year.

FLORIDA WAX SCALE (*Ceroplastes floridensis*)

Qld (JK)

High populations of Florida wax scale are still active on *P. caribaea* at Lannercost, north Queensland.

1.3 PESTS OF PINE (NATIVE)**BARK BEETLE (*Hylurdretonus piniarius*)**

Qld (JK)

There has been minor damage to young stressed *Araucaria cunninghamii* by the bark beetle *Hylurdreconus piniarius* in plantations in the southeast.

1.4 PESTS OF EUCALYPTS

FOLIAGE FEEDERS

PSYLLIDS

Qld (SL)

Psyllids have not yet been reported as causing any problems in joint venture or trial plantations established since the inception of the Private Plantations Initiative (PPI) in 1997. Most plantations are still too young (2 y.o.) to expect problems from this insect group.

AUTUMN GUM MOTH

Qld (SL)

No records yet from joint venture or trial plantations established since 1997.

GUM LEAF SKELETONISER

Qld (SL)

No records yet from joint venture or trial plantations established since 1997.

LEAF BEETLES

Qld (SL)

Leaf beetles became increasingly important pests in the second year of plantings in the PPI program. The main species involved has been *Paropsis* sp. nr. *atomaria* which appears to have a very wide host range. Damage has been especially severe on *Eucalyptus pilularis* (Blackbutt) (from age 1 year) and *Eucalyptus cloeziana* (Gympie messmate) (from age 2 years). Severe defoliation due to this species was noted in three, 2-year old *Eucalyptus cloeziana* joint-venture plantations during 1998/99. In two of these plantations severe defoliation was observed by early December 1998, necessitating insecticide application in one, while in the other high levels of bird predation apparently ended the infestation. Other species commonly recorded in plantations include *Chrysophtharta cloelia* (particularly in Far North Queensland) and *Paropsis variolosa*. A research program is currently being developed into *P.* sp. nr. *atomaria* with the aim of developing a population model.

Monolepta australis, the red-shouldered leaf beetle, was also recorded defoliating *E. grandis* and hybrids near Maryborough in November 1998. This was the first record of this species in current plantations.

CHRISTMAS BEETLES

Qld (SL)

Anoplognathus porosus and *A. boisduvali* have been the most common species observed in Queensland plantations, though damage levels have generally remained low. *E. cloeziana* appears to be the most resistant species and hybrids of *E. grandis* with *E. tereticornis*, *E. camaldulensis* and *E. urophylla* the most susceptible. Some variation in susceptibility within families of these hybrids has been observed and will be investigated further.

HETERONYX BEETLES & OTHER SCARABS

Qld (SL)

Swarming leaf scarabs, mainly *Automolius* and *Liparetrus* spp., were observed in very high numbers across SE Queensland during the period Sept. - Nov. 1998. These beetles preferentially feed on leaf buds and newly expanding foliage and can reduce early season growth rates substantially. At this stage in plantation development, they, along with the paropsine leaf beetles, are the most significant insects

affecting plantation productivity. Most species in the planting program appear to be susceptible to these beetles, with *E. cloeziana* perhaps being the most resistant. Possible differences in resistance to the scarab *Epholcis bilobiceps* between hybrids have also been noted in North Queensland.

SAWFLIES

Qld (SL)

Perga spp. sawflies have been recorded in some trial plantings, but generally numbers have been low and damage insignificant in SE Queensland. In Far North Queensland, more severe sawfly defoliation has been reported on *E. pellita* (Red mahogany) in some trials.

LEAF BLISTER SAWFLY

Qld (SL)

Attack by leaf blister sawfly has been reported in plantations, but incidence has usually been restricted to single, isolated trees. An exception in a trial planting occurred when up to a dozen young (< 1 y.o.) *E. grandis* x *E. camaldulensis* hybrids were attacked, with some consequent mortality.

WINGLESS GRASSHOPPERS

Qld (SL)

No records of attack.

CICADAS

Qld (SL)

No further records of cicada damage following on from that reported here in 1997/98.

STEM BORERS:

WOOD MOTHS

Qld (SL)

Current plantations are too young for wood moth attack to occur. However, previous trial plantings have shown that this insect is a potentially significant damage factor in Queensland and its occurrence and impact will be closely monitored in future.

LONGICORN BEETLES

Qld (SL)

As for wood moths, the bulk of plantations are currently too young for *Phoracantha* spp. attack to occur, but these will also be closely monitored for in future as they mature. A research program is currently underway examining attractant bait and trapping of these beetles.

Some establishment mortality (<5%) in Canterwood Ltd. plantations near Maryborough occurred in 1998 due to girdling by an unidentified longicorn., possibly *Eroschema* sp.

EUCALYPT PLANTATIONS GENERAL:

Qld (SL)

After the first 2 years of plantings under the Private Plantations Initiative (PPI) chrysomelid leaf beetles have manifested themselves as the most significant pests in joint ventures in Queensland. Other insects causing significant levels of damage in these early plantings have been swarming scarabs and to a lesser extent christmas beetles. Research is being initiated into the biology and ecology of *Paropsis* sp. nr. *atomaria* to address the many unknowns related to this species.

Early plantations in the DPI-Forestry joint venture scheme have been established mainly for high value timber production and so it is anticipated that borers will be of special significance in their ongoing economic viability. Research is being initiated into both cossid wood moths and longicorn beetles to address a severe knowledge deficit for these insects. Findings from a 10-year old trial plantation

indicated that both *Phoracantha* sp. and *Endoxyla cinerea* preferentially attacked the larger, fastest growing trees within the plantation, a finding which has been corroborated with other research on similar insects overseas, but which is at odds with accepted wisdom that vigorous trees are more resistant to borer attack.

1.5 OTHER TREE PESTS

RED CEDAR TIP MOTH (*Hypsipyla robusta*)

Qld (MG)

A major new ACIAR project in collaboration with CSIRO Entomology is now underway. Damage from *H. robusta* (Lepidoptera: Pyralidae) has effectively prevented the commercial growing of red cedar (*Toona ciliata*) throughout its native range in Queensland and New South Wales. The present project aims to identify resistant genotypes of *T. ciliata* and other Swietenioideae, assess the impact of companion planting and underplanting on *H. robusta* attack, and assess the effectiveness of insecticide and fertiliser application on promoting and protecting early *T. ciliata* growth. Trials with *T. ciliata* have been established in southeast and northern Queensland, and further plantings are scheduled over the next six months. All plantings remain free of *H. robusta* damage to date. Trials are also to be established in Thailand, Philippines, Laos, Malaysia and Vietnam.

1.6 FOREST HEALTH SURVEILLANCE

Qld (MS)

Forest health surveys were conducted in all State-administered, and most private plantations of both hardwoods and softwoods in 1998-9. New initiatives for 1999-2000 include a major health monitoring programme for native forests, increased intensity of port and airport environs surveys, and intensive surveys of selected native forests near high risk ports. Methodology is being adapted to suit requirements imposed by this broadening of the scope of health surveillance.

1.7 QUARANTINE ISSUES

NATIONAL ASIAN GYPSY MOTH DETECTION TRAP MONITORING PROGRAM

Qld (RW)

A six month trapping program around the Port of Brisbane, airport and surrounding suburbs has been completed. No AGM were trapped.

OTHER INSECTS

Qld (RW)

There were three serious incursions this year of exotic insect pests which required eradication action. The powder post beetle *Lyctus africanus* was found infesting window surrounds in a newly constructed house at Bowen. The timber was imported. The house was fumigated by AQIS. Another exotic powder post beetle *Minthea reticulata* infested flooring in a house at Cairns. In this case the timber was local but cross infestation at the mill from imported exotic ply and timber is suspected. Following surveys of other mills around Cairns, the house was fumigated at the expense of AQIS and DPI Forest Industries Development. The third case involved the Western Drywood Termite *Incisitermes minor* in a boat in Manly boat harbour in Brisbane. The boat had been imported via container from the USA and was fumigated at the owner's expense.

Other post barrier discoveries of interest included the giant bostrychid *Apate* sp. in a wooden artifact from Africa and the bostrychid *Heterobostrychus hamatipennis* in bamboo items from China.

1.8 FOREST PRODUCTS PESTS

WEST INDIAN DRYWOOD TERMITE (*Cryptotermes brevis*)

Qld (BP)

Six buildings in Brisbane, 3 in Maryborough, 1 in Capricornia and 2 in the Sunshine Coast hinterland were fumigated in 1998/99 to eradicate infestations of this pest. A further 13 buildings in Brisbane and

5 buildings in Maryborough were discovered infested during recent surveys and require fumigation. Of particular interest is imminent fumigation of the Industrial Pavilion and associated horse stables, Royal National Association (RNA) in Brisbane due to occur in September 1999. A halfway house for psychiatric patients is also to be fumigated this year. The fumigation will involve relocating 32 residents and 20 carers.

SUBTERRANEAN TERMITES

Qld (BP)

Termite management systems

Much of our time is devoted to fee-for-service consultancy work for industry, testing novel termite management systems. This work is confidential.

Termite Standards

It is a requirement of the *Queensland Building Act 1975* that buildings in Queensland be constructed in accordance with the provisions of the Building Code of Australia (BCA). These provisions specify that all susceptible structural members of buildings be protected from damage by subterranean termites. If the materials and construction comply with Australian Standard AS 3660.1, the requirements of the BCA and the *Queensland Building Act 1975* are satisfied. The use of other methods that will prevent damage to buildings by termites is also permitted in the Act. The decision to accept these preventative methods that are not nominated in AS 3660.1, is at the discretion of each local Council.

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EXTENSION LITERATURE

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2 QUEENSLAND - DISEASES

Mike Ivory
Queensland Forestry Research Institute
PO Box 631
Indooroopilly Q 4068

2.1 Plantations

Diseases of *Pinus radiata* and other subtropical pines.

Dothistroma Needle Blight, caused by *Eruptio* (*syn. Mycosphaerella*) *pini*, continues to defoliate *Pinus radiata* at Gambubal, where a small trial of putative resistant provenances was established some years ago. There are presently no funds to continue this study.

Diplodia Dieback, caused by the fungus *Sphaeropsis sapinea* (*syn. Diplodia pinea*), has been widespread and damaging in plantations of *P.radiata* at Paschendaele during the year, following years of drought combined with overstocking on sites with shallow, rocky soils and Summer hailstorms. Salvage logging was carried out this year in the worst affected areas.

Diseases of Tropical Pines

Diplodia Dieback, caused by the fungus *Sphaeropsis sapinea* (syn. *Diplodia pinea*), has been encountered occasionally on *Pinus* spp, sometimes at a level sufficient to cause significant damage. For example, ongoing infections on young trees at Byfield have caused stem malformation and poor form in a significant proportion of trees.

Phytophthora Root Rot, caused by the fungus *Phytophthora cinnamomi*, continues to give rise to scattered deaths in plantations of hybrid PCH x PEE in SE Queensland, especially on excessively wet sites. Overall damage is however, usually insignificant. Studies to determine the efficacy of "Phytoclean" as a replacement for Formalin for *Phytophthora* control in foot/wheel baths at Toolara nursery have been completed. These confirm that "Phytoclean" is suitable for the disinfection of boots and equipment in foot/wheel baths, providing that thick mud and plant material is removed prior to passage through the baths.

Diseases of Hoop Pine.

Root Rot/Mortality, caused by the fungi *Rigidoporus vinctus*, *Phellinus noxius* & *Rosellinia* spp, continues to affect young 2R plantations in SE Queensland and Far North Queensland. Results after 1 year from a series of observation plots (0-6 years of age) established at Amamoor, Jimna & Yarraman show that mortalities attributable to fungal root rots range from 2 – 7 %. Data for the second year is only available for the 2 year age class plots at Jimna. This assessment revealed that a further 5.4 % of the remaining trees were currently dying from **Poria root disease**, whereas counts of 3-year-old trees at Gallangowan reveal that 3 % are currently affected, with a further 8.6 % missing since refilling, presumably due to root disease. *R.vinctus* is now the major root pathogen encountered in 2R plantations, whereas *P.noxius* was the main pathogen in 1R plantations.

Dothiorella Dieback of branches and leading shoots, associated with *Botryosphaeria ribis* (anamorph *Dothiorella* sp.), continues to occur, but rarely causes significant crop damage. The teleomorph phase has been found, together with the anamorph, both at the base of young trees and on the branches of older trees.

Diseases of Eucalypts

Ramularia Shoot Blight (RSB), caused by *Sporothrix* (syn. *Ramularia*) *pitereka*, was reported on *Corymbia* spp. throughout the year in several Joint Venture plantations and other farm forestry areas in SE Queensland. Establishment of RSB within new plantations may take several months to become noticeable, but subsequent development can take place rapidly, giving rise to moderate to very severe infections within 1 year of establishment. In many cases such infections lead to repeated dieback of the leader, giving rise to stunting of the tree and the development of many lateral branches. RSB resistant trees are apparent in most provenances, but are much more common in some provenances, such as that from Woondum in Queensland. This "resistance" has held up over 2 years and at 2 widely-separated sites. RSB has also been found occasionally on stock plants in nurseries.

Cylindrocladium Leaf Blight (CLB), caused by *Calonectria quinqueseptata* (anamorph *Cylindrocladium quinqueseptatum*), has been noted on *Eucalyptus microcorys* farm forestry plantations of various ages in Far North Queensland, mainly in the period February to June. Severe infections have also occurred on many other *Eucalyptus* species and hybrids this year in Far North Queensland (16 – 19 S), with only *E.pellita* showing acceptable resistance. CLB development appears to be very rapid on all trees within affected plantations, giving rise to the shedding of much of the foliage and the death of young shoots. Laboratory studies indicate that many *Eucalyptus* & *Corymbia* spp. are susceptible to CLB.

Leaf Crinkle, caused by *Mycosphaerella cryptica*, has been quite common in SE & Far North Queensland this year, affecting both young and old foliage of a number of *Eucalyptus* spp. and hybrids. *E.globulus*, *E.grandis*, *E.tereticornis* and various hybrids of the 2 latter species are particularly affected, although some of the latter hybrids show some resistance to the disease.

Several other **Leaf Spot** fungi have also been observed this year on various Eucalypts associated with

leaf necrosis on isolated trees, or at low levels on senescent foliage. These include the following:-

1. **Purple Leaf Spot**, caused by the fungus *Mycosphaerella suttoniae* (anamorph *Kirramyces epicoccoides*), particularly on old foliage of *E.pellita*, *E.cloeziana* & *E.resinifera* in Far N.Q.; and on *E.camaldulensis*, *E.cloeziana* & *E.tereticornis* in SE Q.
2. **Leaf Blotch**, associated with *Coniella* sp & *Cryptosporiopsis* spp, on several eucalypt species, especially on leaves damaged by insect pests.
3. **Leaf Spot**, caused by the fungus *Mycosphaerella nubilosa*, on leaves of *E.dunnii*.

Phytophthora Root / Collar Rot has caused the sudden death of many trees on wet sites in plantations of *E.cloeziana* & *E.pilularis* up to 2 years of age. These usually have decayed roots and root collar, with a defined live edge at or just above ground level. *Phytophthora cinnamomi* is often associated with these trees. This disease has been particularly prevalent in young blackbutt this year following long periods of above average rainfall.

Bacterial Wilt, caused by the bacterium *Ralstonia solanacearum*, was again encountered on young *E.pellita* at Dickenson's block near Cardwell this year following long periods of above average rainfall in the area. Only a few scattered trees were affected.

Stem Cankers were noted on young *Corymbia variegata* in 2 Joint Venture plantings at Somerset Dam and Boonah. These are of indeterminate cause, but are associated with copious flows of kino which become colonised by a sooty mould, tentatively identified as *Ophiocapnocomma phloiophila*, and an unidentified ascomycete fungus. These cankers can be numerous on the small branches and main stems of affected trees, but the number of affected trees is low.

2.2 Managed Natural Forests

Diseases of Eucalypts

Nothing to report.

2.3 Nurseries.

Conifers

Mortality/Red Needle of Pinus Hybrid cuttings:- This rapidly-expanding programme of nursery cutting propagation has now reached c. 1.5 million per year. In the last few years a significant number of cuttings have developed a condition in which the foliage develops a bright yellow or red colouration leading in some cases to death of the whole cutting. This has been particularly severe with many families at Beerburrum Nursery this year, despite the avoidance of families which performed poorly last year. The condition seems to be related strongly to the host provenance and batch, and does not appear to respond to applications of fungicides. Age of the hedge plants from which the cuttings are taken also appears to be important for some of the families involved.

Hardwoods

Shoot blight, caused by the fungus *Calonectria scoparia* (anamorph *Cylindrocladium scoparium*), gave rise to shoot blight and deaths in young *E.cloeziana* plants in Beerburrum nursery following a period of above average rainfall. Control was readily achieved by spraying with fungicides.

Leaf Spot, of indeterminate cause, commonly gives rise to chlorosis and necrosis on the leaves of young *E.cloeziana* at all nurseries surveyed in both SE and Far North Queensland. Older plants appear to be unaffected by the disorder.

2.4 Native Plant Communities

Cylindrocladium Leaf Blight, caused by the fungus, *Calonectria quinqueseptata* was detected on coppice shoots of *E.drepanophylla* at Lannercost adjacent to a field trial of young *Eucalyptus* spp. badly affected by the disease. This forest, which contains several *Eucalyptus* spp., is therefore regarded as the most likely source of inoculum for the outbreak of CLB in the adjacent research trial. CLB was also found on old, wild *E.pellita* trees in NP forest near Mission Beach.

2.5 Urban

Disease samples were received from other government bodies and private individuals from both urban and rural areas during the year. No unusual or significant reports were made.

3 NEW SOUTH WALES - PESTS

Angus Carnegie, D.K.

State Forests of New South Wales

3.1 PESTS OF PINE

Sirex wood wasp

(AC)

This year's *Sirex* surveys are currently being undertaken by the Forest Health Survey Unit. The levels of naturally struck trees remains very low in those areas that have already been surveyed (Bombala & Bathurst). The majority of naturally struck trees are suppressed and in stands overdue for thinning. Ground surveys will again be concentrated in drought stressed areas where last year (1998) large numbers of pines were killed due to infection by *Sphaeropsis sapinea*. . In some areas, numbers of nematodes and parasitoids were below the desired levels. Inoculation with parasitic nematodes should be increased in these drier areas to prevent a potential increase in *Sirex* numbers. Billets of naturally struck trees have been caged to assess the percentage of nematode positive wasps in the natural population.

IPS GRANDICOLLIS

(DW)

As a result of the analysis of the January / February 1999 *Ips grandicollis* pheromone traps from State Forests' Hume Region (Tumut/Tumbarumba), an inspection was organised of various logging and trap sites in the *Pinus radiata* plantations in that region. Moderate numbers of adult beetles were observed in these traps, and also active beetles and larvae in logs. With this level of beetle activity in the area, we can now report that the beetle is established in Hume Region. This transforms the *Ips grandicollis* situation from purely a monitoring / surveillance mode to a monitoring / management mode.

HYLASTES

(AC)

No evidence of damage to new plantings from *Hylastes ater* was observed.

WINGLESS GRASSHOPPER (*Phaulacridium vittatum*)

(AC)

There were no serious outbreaks of wingless grasshoppers in the pines this year. Monitoring of grasshopper numbers will be conducted in spring and summer in Tumbarumba in 1999 where *Phaulacridium vittatum* has previously been a problem.

MONTEREY PINE APHID (*Essigella californica*)

(DK)

Since the detection of *Essigella californica* in Australia in March, 1998 the species has been found to be abundant and widespread in eastern Australia. During 1998-1999 surveys were carried out by the Forest Health Survey Unit in the major pine growing areas in NSW, especially in State forests dominated by *Pinus radiata*. In July, 1998 State Forests of NSW Forest Health Survey Unit set up two *Essigella* monitoring sites in Carabost State Forest, Tumbarumba. The number of monitoring sites was increased to seven in February, 1999 – two in the Macquarie Region (Bathurst & Oberon), two in the Monaro Region (Bombala) and one in the Hume Region (Tumut).

PINE APHID (*Elachnus thunbergii*)

(DK)

Surveys initiated to monitor the distribution of *Essigella* have also collected distribution data on *Eulachnus thunbergii*. The distribution of *E. thunbergii* has not changed, with the southern most record in NSW still Oberon. Interestingly, *E. thunbergii* has been found on the same *P. radiata* trees as *E. californica*.

PINE LOOPER

(DK)

In November 1998 the Pine Looper, *Chlenias* sp. was reported in a 1990 age class of *Pinus radiata* in Carabost State Forest. These species of Australian defoliators attack a wide range of hosts including *Eucalyptus* and have been reported to cause serious damage to *P. radiata*. A subsequent survey of the area showed that the infestation was very localised and control was not initiated.

POSSUMS

(AC)

Aerial and ground surveys of possum damage in pines was conducted in Bombala in June. Extensive damage has been caused by possums in Bombala in recent years, and the damage has increased again this year, mainly in area of plantation affected, with possums moving into areas previously undamaged.

WALLABIES

Browsing from wallabies was a problem in young stands adjacent native bush and retention strips in many regions in NSW. Wallabies strip bark off at the base of young pines. In some cases up to 90% of young trees are attacked. The implications of this damage on wood quality are unclear. Less than 1% of trees were killed as a result of wallaby damage.

3.2 EUCALYPT PESTS

PSYLLIDS

(AC)

The Forest Health Survey Unit observed damage from *Cardiaspina fiscella* and *C. maniformis* in 2-5 year old *E. grandis* plantations in northern NSW this summer/autumn. In only a few cases was damage severe, with over 75% of trees in a plantation attacked and up to 50% severity (leaf area damaged) causing defoliation. In most cases, however, damage from psyllids in these young plantations was minor.

An outbreak of the lerp psyllid *Creiis* sp. nr. *literalta* caused extensive damage in a 3-year-old *E. dunnii* plantation near Casino, in northern NSW (Morpeth Park). Severe damage occurred to trees, where up to 100% of leaves were damaged and killed. Up to 100 ha were affected. Recovery of this site is being monitored: some trees have died, and many are producing epicormic shoots. This is the first record of this species of psyllid causing extensive damage in *E. dunnii*. The insect was also observed at two other sites, but only at minor levels. It appears that the outbreak at Morpeth Park began around October/November 1998, and by December had reached its peak (?), before suddenly declining. There were very few active insects observed in February 1999. Psyllid activity will be closely monitored from September onwards. This site was subject to waterlogging, which may have exacerbated this problem.

CHRYSOMELIDS (*Chrysophtharta* spp. & *Paropsis* spp.)

(AC)

Both *Chrysophtharta cloelia* and *Paropsis atomaria* were amongst the most destructive pests in young eucalypt plantations in northern NSW. In some cases trees were totally defoliated by these insects (as well as Christmas beetles). *E. dunnii* and *E. grandis* were the two most damaged hosts.

MONOLEPTA BEETLES (*Monolepta australis*)

(AC)

There were no serious outbreaks of Monolepta beetles observed this year. This species was observed causing minor damage in a 2-year-old *E. grandis* plantation though, which is a new host record for *Monolepta australis* in young eucalypt plantations in NSW.

CHRITSMAS BEETLES (*Anoplognathus* spp.)

(AC)

Christmas beetles (*Anoplognathus* spp.) caused defoliation in late spring/early summer in many young eucalypt plantations in northern NSW, with *E. grandis*, *E. dunnii* and *Corymbia maculata* being the most severely damaged. Most of these damaged trees showed signs of recovery by late summer early autumn. In one case, an *E. dunnii* plantation was totally defoliated by Christmas beetles (and also chrysomelids).

AUTUMN GUM MOTH

(DK)

Minor damage was observed in young *E. nitens* plantations in southern NSW by *Mnesampela privata*.

SAWFLIES (*Perga* sp)

(AC)

Minor damage to eucalypt plantations was attributed to sawfly larvae. In most cases damage occurred to isolated trees, where up to 50% of the foliage had been eaten.

LEAF-BLISTER SAWFLIES

(AC)

Severe outbreaks of leaf-blister sawfly larvae (*Phylacteophaga froggatti*) occurred in a few *E. dunnii* and *C. maculata* plantations in northern NSW. In some cases extensive damage had occurred to young plantations (2-year-old), where up to 100% of trees were damaged at up to 50% severity (leaf area damaged). These severely infested stands were in waterlogged areas, perhaps exacerbating the problem.

GUM TREE SCALE

(AC)

In most cases, gum tree scale (*Erriocooccus* spp.) was observed at very low levels in young plantations (<1% incidence), and often infested trees were on waterlogged sites and/or under stress. The majority of hosts were *E. grandis*. In one case though, up to 20% of a 2-year-old *E. grandis* plantation had gum tree scale. This was a waterlogged site.

STEM BORERS

(AC)

As the eucalypt plantation estate in NSW increases in age (many plantations now 3-5 years old) the number of trees damaged by stem boring insects has increased. Both the number of plantations with damaged trees and the number of trees in these plantations with stem borer damage increased this year. In some cases, 45% of 3-4-year-old *E. grandis* trees in plantations on the north coast had stem borer damage. Longicorn beetles were again one of the main damaging insects, but there was more damage from cossid moth larvae this year. Again, *E. grandis* was the most damaged host (both cerambycid and cossid), followed by *E. pilularis* (mainly cerambycid). Cockatoos had caused damage to some of the *E. grandis* trees infested with cossid moth larvae.

Damage from Xyloriditids was mainly confined to trees with small diameters (<7cm) or branches. *E. grandis* and *E. pilularis* were the two most damaged hosts.

It was also observed by the Forest Health Survey Unit while travelling around NSW on field trips that many small diameter (<10cm) amenity plantings (*Eucalyptus*, *Acacia* and *Casuarina*), especially along roadsides and in parklands, had been attacked and killed by stem borers (cerambycids and xyloictids?). This is a higher number than was observed in previous years.

PHASMATIDS

(AC)

An outbreak of phasmatids (*Didymuria violescens*) in native state forests in Hume Region (Tumut/Tumbarumba) was reported to the Forest Health Survey Unit in May 1999. This area was aerially surveyed using the Automated Real-Time Mapping Software system that uses GPS to plot the route of a vehicle (in this case a helicopter) that can be overlaid onto GIS maps. The damage was extensive, covering approximately 8570 ha in three state forests (Buccluech SF – 4645 ha, Bago SF – 2190 and Maragle SF – 1735 ha). The main eucalypt species attacked was *E. radiata*, *E. dabrympleana*, but *E. delegatensis* and *E. pauciflora* were also damaged. Total defoliation of some trees was observed. A similar outbreak in the same area occurred during the 1950's and early 1960's, causing extensive damage and loss of growth. Some areas were control sprayed with insecticide. The current outbreak will be monitored in the following years to determine if control methods need to be applied.

WATERLOGGING

A higher than usual number of plantations suffered from waterlogging this year, due to the heavy rains on the north coast. *E. dunnii* was the most affected species, possibly due to sites chosen for planting (low lying areas). Evidence of waterlogging included purple foliage and reduced growth rate (compared to trees on higher ground). Those trees that were severely affected by insects (eg. *Creiis* sp. in *E. dunnii* and leaf-blister sawfly larvae in *C. maculata*) were situated in waterlogged areas. Mortality from *Phytophthora* was also higher in wet areas this year.

3.3 FOREST HEALTH SURVEILLANCE

(AC)

Forest health surveillance continued in both the hardwood and softwood plantations throughout NSW in 1998/99. Aerial surveillance (by helicopter) was trialed in the larger (>500 ha) eucalypt plantations to examine the usefulness of this method for determining extent and severity of disorders in these young plantations (2-5-year-old). This method proved useful in identifying problem areas and stratifying the ground survey, thus reducing time spent doing ground surveys. The surveillance methodology for softwoods plantations changed slightly for 1999, with less reliance and time spent on "drive-through" surveys, and more "targeted" ground surveys, concentrating on younger age-classes.

4 NEW SOUTH WALES - DISEASES

Jack Simpson

State Forests of New South Wales

4.1 DISEASES OF PINES

DOTHISTROMA SEPTOSPORA

When the *Pinus radiata* plantations were surveyed in winter 1998, there was very little infection by *Dothistroma*, except in the Walcha/Nundle forests that continue to have low to moderate levels of *Dothistroma*. However, due to heavy spring rains in 1998 in many of New South Wales' *P. radiata* growing regions, damage from *Dothistroma* has increased, and hence was greater in 1998/99 than in the previous 2-3 years. In June 1999 *Dothistroma* needle cast was significant (30% severity) in Monaro Region (Bombala) in plantations situated in low-lying areas that receive fogs and misty rains. These areas in Monaro Region have had a history of *Dothistroma* infection, and some have been sprayed with copper fungicide in the past. There was little infection on current season's needles though, as little rain has fallen since late 1998. Significant *Dothistroma* infection and needle cast was also observed in Hume Region (Tumbarumba), which was an increase in damage observed since July 1998. Severe infection in young *P. radiata* (1996-97 a/c) was observed in the Acacia Plateau plantations near Urbenville in northern NSW. Some of these young trees had up to 90% infection and needle cast. Woody weeds were tall and numerous in these plantings, and would have increased humidity around the pines. The majority of the 1996 plantings at Acacia Plateau had 30-50% severity, while the 1997 plantings had an average severity of 15-30%. These plantations are being considered for control spraying in 1999. Minor damage from *Dothistroma* was observed in the Oberon forests. The *P. radiata* plantations in Tumut, Tumbarumba, Walcha, Moss Vale and Queanbeyan are to be surveyed in August-September 1999.

CYCLANEUSMA MINUS

Cyclaneusma minus was widespread in the NSW *P. radiata* plantations in 1998/99. Needle symptoms associated with *Cyclaneusma* infection and Monterey pine aphid, *Essigella californica*, attack was observed on needles, other than current year needles, in the majority of *P. radiata* plantations surveyed.

ARMILLARIA

Damage from *Armillaria novaezelandiae* and *A. fumosa* was observed in the young (1996-97 a/c) *P. radiata* plantations at Acacia Plateau near Urbenville in northern NSW. Up to 8% mortality was observed in localised areas. Over the whole plantation area 2-4% mortality was observed, in both the 1996 and 1997 a/c. This area is an ex-Bunya pine (*Araucaria bidwilli*) plantation that had a history of *Armillaria* infection. Elsewhere in NSW mortality of pines due to *Armillaria* infections is rare.

SPHAEROPSIS SAPINEA

Widespread and severe damage from *Sphaeropsis* was observed during the forest health surveys in June-September 1998. In the worst affected areas, up to 45% of trees were killed or had dead tops. Moderate to severe damage from *Sphaeropsis* was observed in the majority of State Forests' *P. radiata* plantations. Infection and mortality from *Sphaeropsis* was most severe on sites with shallow soils or a north or westerly aspect. Here soil moisture would be limiting (especially under the prevailing drought conditions) and there were often nutrient deficiencies too (e.g. boron). Many of the affected stands were overdue for their first thinning. Surveys in June 1999 reveal that damage from *Sphaeropsis* is much less this year. Salvage logging of affected plantations was rarely attempted.

FUSARIUM (Pine Pitch Canker)

Samples of dead tops, resinous stem and branch cankers, and dead natural regeneration from *Pinus radiata* plantations in all Regions in State Forests of N.S.W. pine growing Regions of N.S.W. and A.C.T. were collected by the Forest Health Survey Unit in 1998 and 1999. Isolations from this material has yielded no *Fusarium circinatum*. The great majority of isolates were *Sphaeropsis sapinea*.

PINE STEM GALL

After the discovery of galls in young pines in Tasmania earlier this year, surveys have been made of 1996-98 *a/c P. radiata* plantations in N.S.W. No galls of the kind observed in Tasmania have been found as yet.

4.2 DISEASES OF EUCALYPTS*PHYTOPHTHORA*

Considerable mortality caused by *Phytophthora cinnamomi* was observed in young eucalypt plantations (up to 5 years old) in 1998/99. *Eucalyptus pilularis* and *E. cloeziana* were the species affected. In plantations on poorly drained sites there was commonly about 10% mortality.

AULOGRAPHINA EUCALYPTI

Damage from *Aulographina eucalypti* was mainly restricted to older foliage in the young eucalypt plantations. There were no severe outbreaks, with the majority of damage being less than 5% severity. *Eucalyptus pilularis*, *E. globulus* and *E. nitens* were the most susceptible hosts.

PHAEOPHLEOSPORA EUCALYPTI (= *Septoria pulcherrima*)

Minor damage from *Phaeophleospora eucalypti* was observed in *E. nitens* plantations in southern NSW (Bombala).

MYCOSPHAERELLA LEAF SPOTS

Mycosphaerella cryptica was common in many plantations, but only at trace to low levels. *Eucalyptus saligna*, *E. nitens* and *E. pilularis* were the most susceptible hosts. *Mycosphaerella suberosa* was observed in a few *E. dunnii* plantations where it was causing minor damage during early 1999. Previously, in Australia this species had only been reported from Western Australia.

CONIELLA FRAGARIAE

Leaf spot caused by *C. fragariae* was common on lower foliage in many young *E. dunnii* plantations, similar to previous years. Trees growing in boggy or waterlogged areas had higher infection levels. Infected leaves seem to be retained on trees for a long time, even though up to half of the leaf area may be infected and necrotic. Minor infection was also observed on *E. grandis*, previously an unrecorded host.

ENDOTHIA GYROSA STEM CANKER

Endothia gyrosa stem cankers was observed causing damage and mortality in 3 & 5 year-old *E. dunnii* plantations in northern N.S.W. Early symptoms of the canker appear about half way up the tree, as a dead and dying patch up to 1 metre long. The bark on the patch is commonly cracked and split with some kino exudation. The cambium and sapwood under the patch is usually dead. The tree eventually dies above this point, with live branches and the development of epicormic growth below. The whole tree can eventually die. So far the canker only seems to attack older trees greater than 2 years old. This is the first occurrence of this problem in Hardwood Plantations Division's plantations. It has only been observed at two sites. At one site, west of Kyogle, 5% mortality had occurred, with 5% of live trees showing symptoms. The other site (north of Kyogle) had <1% mortality.

NATIVE FORESTS

No noteworthy disease outbreaks were recorded in native forests in NSW this year.

5 VICTORIA - PESTS

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5.1 PLANTATIONS

Pests of Pine Plantations

Sirex Wood Wasp (*Sirex noctilio*)

Sirex has remained at very low levels throughout 1998/99 in most pine areas of Victoria. However, due to the dry conditions experienced over the past two years, growers have been advised to ideally thin where possible, or increase trap tree plots and subsequent inoculation with nematodes in unthinned stands to ensure *Sirex* populations are kept at manageable levels. Mention should be made of emergence data gathered over summer 98/99 that has indicated the parasitic wasp *Ibalia leucospoides* has reached in some areas of the state, a 70 to 80% level of *Sirex* parasitism. This is very pleasing given the low level of parasitism (approximately 25-30%) recorded during its initial releases in the early 1980's.

Five Spined Bark Beetle (*Ips grandicollis*)

Apart from a minor infestation in the north east of the state where approximately 50 *P. radiata* trees age three were affected, no major *Ips* outbreaks have occurred. Growers are being advised to monitor plantation sites for *Ips*, especially during summer on logged sites with large amounts of fresh green slash adjacent to young stands.

Other Bark Beetle Species

A minor outbreak of the Golden Haired Bark Beetle (*Hylurgus ligniperda*) was recorded in young *P. radiata* plantings in Gippsland. The source of the infestation was traced to an adjacent small stand of old *P. radiata* trees which were removed, resulting in the cessation of the infestation.

Monterey Pine Aphid (*Essigella californica*)

The Monterey Pine Aphid (*Essigella californica*) has now been recorded in all pine growing areas of the state. Trees defoliated in mid 1998 showed signs of refoliation as of summer 1999. In autumn 1999, *Essigella* populations showed signs of once more increasing with attack predominantly occurring in thinned *P. radiata* aged 15 years +. Monitoring protocols developed by Debbie Kent (State Forests NSW) have been established across the state to more closely monitor aphid populations and tree health.

Other Pests of Pine

Some minor armyworm (Hadeninae) and wingless grasshopper (*Phaulicridium vittatum*) damage was recorded in newly established Radiata Pine plantations in the south west of the state. Prompt control measures were implemented before potentially serious damage occurred.

Pests of Eucalypt Plantations

Psyllids

Low levels of psyllid damage (*Cardiaspina* spp.) were recorded on *E. camaldulensis* plantations in the Shepparton irrigation region during early summer 1999. Populations observed were not likely to warrant control measures being implemented, although subsequent activity levels have been monitored to ensure populations remain at low levels.

Autumn Gum Moth (*Mnesampela privata*)

Apart from isolated localised outbreaks causing moderate levels of defoliation, Autumn Gum Moth populations remain at predominantly trace to low levels across the eucalypt plantation estate in Victoria during 1998/99.

Leaf Beetles

Low levels of damage by the leaf beetle *Chrysophtharta agricola* and *C. variicollis* were observed on *E. viminalis* and *E. globulus* plantations in East Gippsland. Damage however, was not widespread and tended to be confined to small sections of the plantation estate in the upper 50% of the tree crown.

Sawflies (*Perga* spp.)

Low levels of damage by the Steelblue sawfly (*Perga affinis affinis*) have been recorded in *E. camaldulensis*, *E. globulus* and *E. occidentalis* plantings between three and six years old in the Shepparton (north central) area. Damage tended to be confined to isolated and small groups of trees, with the upper 50% of the tree crown suffering the most defoliation.

Christmas Beetles (*Anoplognathus* spp.)

Low levels of Christmas beetle (*Anoplognathus* spp.) damage were recorded on 1-2 year old *E. globulus* plantations in Gippsland and North East Victoria during summer 1998/99.

Leaf Blister Sawfly (*Phylacteophaga froggatti*)

Low levels of the leaf-blister sawfly (*Phylacteophaga froggatti*) were recorded on young juvenile foliage of *E. grandis* plantations around Shepparton and northern Victoria. While some attacks were severe, these tended to be isolated to individual trees where damage up to 50% of the leaf area, confined predominantly to the lower crown, was recorded.

Other Pests of Eucalypt Plantations

Minor Gumleaf Skeletoniser (*Uraba lugens*) damage was noted on four-year-old plantings of *E. camaldulensis* in northern Victoria although no control measures were required. Low levels of Gumtree scale (*Eriococcus* spp.) were also observed on two-year-old *E. globulus* plantings in Central Gippsland. In some patches, up to 20-30 trees were affected although subsequent observations noted levels declining and consequently, no control was required.

Pests of Other Plantation Tree Species

Damage by xylorectid wood moths was observed in a small stand of *Salix* outside of Melbourne. The damage observed was minor in nature and confined to isolated trees. Observations will continue to monitor wood moth populations.

5.2 NATURAL FORESTS

Studies are continuing into the effects of repeated fuel reduction burning on litter invertebrates in dry sclerophyll eucalypt forest in west-central Victoria. Work on the short-term effects over three years has been mostly completed while studies examining the long-term effects over 10 years are in the process of

being finalised. Work has also been done on the short-term effects of wildfires on litter invertebrates in mountain ash forests in the Victorian Central Highlands.

Observations of the population levels of the Mountain Ash Psyllid (*Cardiaspina biliobata*) are also continuing with recent work indicating they are currently at low levels.

5.3 QUARANTINE

Surveys have been conducted over summer 1998/99 in the ports of Melbourne, Geelong and Westernport to detect Asian Gypsy Moth (*Lymantria dispar*), a major potential threat to the forest industry in Victoria. No moths were detected during the course of the survey work.

5.4 EXTENSION LITERATURE

A new updated series of eucalypt plantation pest notes has been completed and is currently in the process of being placed on the Departmental website. Another Departmental website has also been developed which will allow treegrowers to obtain information on insect pest and disease species, their lifecycles, mode of attack and possible control measures, likely to be encountered in their locality.

6 VICTORIA - DISEASES

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6.1 Plantations

Pinus radiata

Routine surveys undertaken in early September 1998 for levels of *Dothistroma septospora* continued to show low levels of disease, and no spray programs were conducted in the State for 1998/99. The above average rainfall for beginning of spring had little impact on disease development and no reports of defoliation due to *Dothistroma* were reported for 1998/99

Frost symptoms were recorded in May in Christmas tree plantations around Ballarat and 2-year-old seedlings at Rennick. The symptoms included wilting due to death of needles at the needle sheath. The influence of moisture stress on frost incidence is unknown. The aphid, *Essigella californica* was also present in large numbers on the Ballarat samples.

Southern Victoria is still being affected by rainfall deficiencies with some areas having the driest 33-month period on record. In July 1998, an inspection was made of defoliating 30-year-old *Pinus radiata* at Running Creek, Myrtleford. Wood samples collected from the trees showed no fungal staining or resin flow and the moisture content of the wood of living trees with dead tops was extremely low. It was concluded that moisture stress was probably the main cause of the defoliation with a possible interaction with *Essigella*.

Root coiling was a problem in a Christmas tree plantation in the Latrobe Valley.

Eucalypts

Due to the dry conditions, very few foliage diseases affected eucalypt plantations in Victoria through 1998/99. The dry conditions are also causing some losses in some rainfed eucalypt plantations throughout Victoria. Root coiling again has been attributed to some losses of *E. nitens* in northeast Victoria.

Alcoholic flux first reported in March 1998 on the stems of 3/4 year-old *Eucalyptus nitens* was again observed in April 1999 in plantations in north-east Victoria. Glasshouse inoculations with a fungus isolated from lesions associated with the flux (*Ramularia* sp) produced only small lesions and no flux produced. Although no trees have yet died from the disease, the impact the lesions are having on wood quality and degrade is of concern. The role of moisture stress in lesion and alcoholic flux production is yet to be determined but is suspected as playing a major role in symptom development.

6.2 Managed natural forests

Eucalypts

Few diseases were reported from native forest. Again dry conditions in Victoria over 1997/98 have resulted in less disease attributed to *Phytophthora cinnamomi*, although reported drought deaths may have been exacerbated by previous root disease.

6.3 Nurseries

Conifer

Monitoring of nurseries for *Phytophthora cinnamomi* remains a high priority so as to reduce the further spread of disease. Trials are continuing to evaluate the use of *Trichoderma* to control nursery diseases, and the influence of salt in predisposing seedlings to attack by *P. cinnamomi*.

High levels of nematodes have also caused problems in one nursery and action taken to alleviate these problems.

Eucalypt

Few problems were reported from nurseries.

6.4 Native Plant Communities

Studies into dieback within isolated stands of native forest have shown no evidence of fungal pathogens in association with the symptoms. In two cases Bell Miner/Psyllid interactions were probable causes and in another browsing by possums. *Armillaria luteobubalina* continues to be a problem within Parks of the Dandenong Ranges creating hazardous trees to tourists and residents of the area. An unidentified branch canker of *E. pauciflora* is also creating hazardous trees within camping areas of the Alpine National Park.

Mundulla Yellows continue to be of concern in northwest Victoria and across the border into South Australia. Work is continuing at the Waite in Adelaide to identify the phytoplasmid associated with the symptoms.

6.5 Urban

Surveys for Dutch Elm Disease were undertaken in the main gardens and boulevards around the City of Melbourne. Symptoms resembling DED were attributed to ringbarking of branches by possums and elm bark beetles. The fungus could not be isolated from wood. A draft contingency plan for the disease has been developed to enable a rapid response to the disease should it enter Victoria.

Cypress canker was identified from dieback of Cypress shelterbelts from several locations in Victoria

7 TASMANIA - PESTS - FORESTRY TASMANIA

7.1 PLANTATIONS

Dick Bashford
Forestry Tasmania

Pinus radiata

Sirex Wood Wasp (*Sirex noctilio*)

The annual survey of unthinned and suspect compartments is currently being undertaken. *Sirex* killed trees have been located in two northern compartments which have a recent history of *Sirex* activity. Small numbers of trees are present, mainly subdominants. Several shipments of *Sirex* parasitoids were sent to Brazil and South America last year and requests for *Rhesus persuasoria* have been received for the current year from those countries and Argentina.

Black Pine Beetle (*Hylastes ater*)

Although present in most stands in Tasmania there were no problems in newly planted sites.

Monterey Pine Aphid (*Essigella californica*)

Monitoring throughout the pine estate and nurseries at different times during the summer and autumn failed to detect the aphid.

Similar surveys will be conducted this year.

Other

The Forest Health Survey team detected considerable defoliation to a four-year-old planting by adult weevils. Adult weevils have been tentatively identified by ANIC as *Scotasmus* sp (*Peripagis* sp.) a genus confined to Tasmania at present. Surveys will be repeated in spring.

Eucalypt plantations

Chrysomelids

A total of 108 coupes, aged 18 months to 5 years of age, were monitored over the summer period for the chrysomelid species, *Chrysopharta bimaculata* and *Chrysopharta agricola*. Larval populations in the estate were low but newly emerged adults feeding in autumn caused considerable damage. Options for controlling adult populations of leaf-beetles in autumn are being reviewed. Development of the IPM monitoring system continues to evolve enabling coverage of the expanding estate to be both practical and economic.

Autumn Gum Moth (*Mnesampela privata*)

Several young plantations were monitored using light-traps and ground surveys but populations were low.

Gum Leaf Skeletonizer (*Uraba lugens*)

Although present in most plantations little activity was recorded.

Weevils and Cerambycids

Activity by the cerambycid *Phoracantha mastersi* has been minor except in a few northern small woodlots where trees have been killed.

It has been noted that many species of smooth barked eucalypts, but especially *E. globulus*, have horizontal markings especially in the bole area caused by weevil larvae tunnelling in the cambial layer just under the bark. Cages were attached to some of these trees and adult weevils captured.

The weevil has been identified by ANIC as *Pelrorhinus transversus*. Many *E. globulus* trees damaged by the weevil are subsequently attacked by the cerambycid *P. mastersi*.

Others

Minor damage by scarabs (*Heteronyx* spp.), sawflies (*Perga affinis*) and various chrysomelid species occurred in many plantings but had little effect on coupe increment.

A new series of colour leaflets depicting the major insect pest species has been produced.

7.2 MANAGED NATURAL FORESTS

Eucalypts.

Considerable damage is occurring in young regeneration areas currently selected for thinning. Stem borers (hepialid moths, cerambycids, and weevils) combined with defoliators (chrysomelids and scarabs) are causing serious increment losses and form defects. An assessment system is now in place to measure damage levels enabling management recommendations to be made.

7.3 QUARANTINE MONITORING

Surveys were conducted to detect Asian gypsy moth (*Lymantria dispar*) and Monterey pine aphid (*Essigella californica*). Neither species were detected.

Surveys of high risk planting's of both *Pinus* spp. and *Eucalyptus* spp. near ports and container depots will be conducted to detect the establishment or incursion of any exotic pests or diseases.

8 TASMANIA - PESTS - NORTH FOREST PRODUCTS

Dave de Little (Manager – Forest Biology)

8.1 GENERAL

North forest Products (NFP) is responsible for the management of 47,000 ha of eucalypt tree farms (ETF) and 5,000 ha of *Pinus radiata* tree farms (PTF) in Tasmania. Several forest insect pest outbreaks capable of causing economic injury occurred during the past 12 months and a total of 714 ha was treated with insecticide.

8.2 FOREST HEALTH SURVEILLANCE

North Eucalypt Technologies (NET) continued to undertake forest health surveillance in NFP's owned and joint-venture ETF. Aerial surveys covering approximately 3,629ha and ground-based surveys covering approximately 3,077ha were undertaken in *E. globulus* and *E. nitens* ETF aged from 0.5 to 11 years. The main insect pest symptoms detected were due to chrysomelids, autumn gum moth, gum-leaf skeletoniser, *Gonipterus* weevil, *Heteronyx* cockchafer and *Hesthesis* borer. A number of new leaf pathogenic fungi were detected and identified by Dr ZiQing Yuan (University of Tasmania).

8.3 INSECT PEST MONITORING

About 40,000 ha of ETF were monitored for insect pests and a number of incipient outbreaks encountered. An integrated pest management approach was adopted which involved monitoring of natural predator populations and changes in climatic conditions, and as a result treatment of only 1.37% of the estate with synthetic insecticides was undertaken.

Chrysomelids

Some large populations of *Chrysophtharta agricola* attacked *E. nitens* ETF in northern Tasmania. 714ha. were aerially sprayed with the synthetic pyrethroid "Dominex" to control these outbreaks and successful control was achieved in the areas sprayed.

Autumn Gum Moth

A significant occurrence of *Mnesampela privata* larvae was noted on 1 and 2 year old *E. nitens* and *E. globulus* ETF at Woolnorth in far NW Tasmania. Some other minor occurrences were noted in northern and eastern Tasmania

Gum-leaf Skeletoniser

An outbreak of *Uraba lugens* was detected in 6 year old *E. nitens* ETF near Biralee in northern Tasmania. 2 sides of the ETF were bounded by native forest, and the attack was heaviest on ETF trees in the rows adjacent to this boundary where many trees were 90% + defoliated.

Heteronyx cockchafer beetles

Large populations of these beetles occurred on newly established (less than one year old) *E. nitens* ETF in NW Tasmania at sites with an elevation of greater than 500m above sea level. Two main species have been identified, *Heteronyx crinita* Blackburn, and *H. dimidiata* (Erichson). These two species caused heavy defoliation damage to newly planted seedlings at several sites. The adult beetles burrow

into the soil around the seedlings when they are not actively feeding. Life-cycle studies were undertaken, and larvae of *H. crinita* were observed in the soil from January through to June.

A joint bid with Western Australia for CRC for Sustainable Production Forestry Strategic Initiatives Fund funding for collaborative work on African Black Beetle/Spring Beetle (*Liparetrus jenkinsii*)/*Heteronyx* biology and control was successful. This will allow detailed field studies to be undertaken in WA and Tasmania between August 1999 and February 2000.

9 TASMANIA - DISEASES

9.1 Plantations

Pinus radiata (and other temperate pines)

The most significant new problem in *P. radiata* was the detection, during the year, of stem and branch galls from several plantations (mostly 1997 plantings) in northeastern Tasmania. The incidence of affected plants was about 1 in 1000 within affected compartments. Outwardly the galls were morphologically very similar to young western gall rust infections. However exhaustive testing by both microscopic examination and DNA analysis failed to find any evidence of the rust. Forest Health Committee has met to consider the detection and the negative results of tests for western gall rust. Arising from this meeting was the decision to inform *P. radiata* plantation owners throughout Australia of the detection and ask them to inspect their young plantations for galls. As a consequence of the work done to diagnose the cause of the galls a protocol has been developed which provides a rapid and reliable diagnosis of western gall rust. Further tests are being conducted to diagnose the cause of the galls.

What appears to be rotation-length impact of Spring Needle Cast is appearing in some harvesting operations of the early stands managed under a clearwood regime in northwestern Tasmania. Trees with less than expected post-pruning diameter growth are causing utilization problems because of an insufficient width of clear wood being produced over large diameter knotty cores. This is currently being addressed by increasing the lower threshold of log diameters for sawlogs but has resulted in problems in meeting sawlog volume targets.

Shoot dieback associated with *Sphaeropsis sapinea* has been found throughout the State in young *P. radiata* plantations. The incidence of the problem, however, is low and not considered to be having a significant impact.

Dothistroma septospora continues to be of little concern in Tasmania.

Undescribed species of *Cladosporium* and *Pestalotiopsis* were associated with lesions at the base needles causing them to droop. The problem is minor and has only been seen on trees growing in imperfectly drained soils.

Phytophthora cinnamomi and *P. citricola* have been isolated from soil within patches of dead and dying trees in a young seed orchard.

Eucalypts

This year saw the commencement of health surveillance of eucalypt plantations in Tasmania. Leaf blight of *E. globulus* and *E. nitens* due to infection by *Mycosphaerella nubilosa*, *M. cryptica* or *M. tasmaniensis* was the most widespread disease problem encountered, particularly in northwestern Tasmania. However, significant defoliation was localised and in plantations owned by Forestry Tasmania was seen in only two 3-years-old compartments. Several new disease records were found but all, with the exception of a root and collar rot associated with a *Cryptosporiopsis* species, were uncommon and having minor impact.

Cryptosporiopsis sp. (possibly a new species) has been consistently isolated from root and root collar lesions on young dead and dying *E. nitens* from three plantations in northwestern Tasmania. In one of

the plantations symptoms were expressed as a slow decline with leaf reddening and progressive crown thinning preceding mortality. Affected patches in this plantation were strongly associated with shallow soils overlying basalt bedrock. In the other two plantations, however, symptoms of disease appeared as a very rapid blight of previously vigorous trees. Inoculations of the fungus onto the stems of *E. nitens* seedlings produced necrotic lesions.

Gloeosporidina moravica (spermatial state of *Apiognomonina quercina*) was constantly isolated from leaf and shoot lesions on *E. globulus* from two 1-year-old plantations in far northwestern Tasmania. The leaf lesions associated with this fungus were quite distinctive, appearing as a purple discolouration of the midrib at the base of the leaf with discoloured tissue eventually becoming necrotic. Affected plants were very uncommon and damage minor.

Shoot lesions of *E. globulus* caused by *Botrytis cinerea* were scattered, at a low incidence, throughout 1-year-old plantations in far northwestern Tasmania. Fungal sclerotia formed abundantly in necrotic shoot tissue.

Seimatosporium aff. *arbutii* was isolated from a single *E. globulus* with extensive stem cankering in 3-years-old plantation in far northwestern Tasmania.

Several new fungal species or new records for Australia/Tasmania have been found on leaf lesions. All are quite uncommon and of little economic significance. The records are listed in Table 9.1.

9.2 Managed natural forests

Eucalypts

Severe crown dieback is affecting *E. delegatensis* forests across wide areas of the Central Plateau. In areas across the northern edge of the plateau extensive dieback was first noticed in 1996. Affected trees appeared to show good recovery during the following 1-2 years but their condition has again deteriorated over the past 12 months. The cause of the dieback has not been investigated in detail.

E. gunnii forests on the Central Plateau have been severely defoliated by possums during the past 12 months. Many trees have died.

9.3 Nurseries

Conifers

No significant disease problems to report.

Hardwoods

Gloeosporidina moravica was isolated from leaf lesions on *E. globulus* seedlings at Perth Nursery. Damage was minor. No other significant disease problems to report.

9.4 Native plant communities

Shoot dieback of the endemic conifer *Diselma archeri* was associated with root lesions and basal stem and branch cankers. An undescribed species of *Pseudophacidium* was frequently isolated both from root lesions and cankers. Currently the disease has been found at four sites within National Parks in central Tasmania. The most severely affected stand is in the Walls of Jerusalem National Park.

9.5 Urban

A mature *E. globulus* street tree was removed by the Hobart City Council because of the risk of mechanical failure due to decay by *Phellinus robustus*. The *Armillaria luteobubalina* root disease problem in the Tasmanian Botanical Gardens has not progressed since the removal of soil and roots from the main infection centres two years ago.

Fungal species	Host	Status
<i>Dichomera versiformis</i>	<i>E. nitens</i>	New species
<i>Cylindrotrichum</i> sp	<i>E. nitens</i>	New species
<i>Pseudocercospora</i> sp.	<i>E. nitens</i>	New species
<i>Harknessia hawaiiensis</i>	<i>E. obliqua</i>	First record for Australia
<i>H. tasmaniensis</i>	<i>E. nitens</i> and <i>E. globulus</i>	First record for Tasmania
<i>H. victoriae</i>	<i>E. nitens</i>	First record for Tasmania
<i>Anthostomella eucalypti</i>	<i>E. globulus</i>	First record for Tasmania
<i>Colletogloeopsis nubilosum</i> (anamorph of <i>Mycosphaerella</i> <i>cryptica</i>)	<i>E. obliqua</i>	First record for Tasmania
<i>Idiocedris australis</i>	<i>E. globulus</i> , <i>Eucalyptus</i> sp.	First record for Tasmania
<i>Vermisporium cylindrosporum</i>	<i>E. nitens</i> and <i>E. globulus</i>	First record for Tasmania
<i>V. eucalypti</i>	<i>E. nitens</i>	First record for Tasmania
<i>V. obtusum</i>	<i>E. obliqua</i> and <i>E. regnans</i>	First record for Tasmania
<i>Fairmaniella leprosa</i>	<i>E. nitens</i>	First record for Tasmania
<i>Readeriella miabilis</i>	<i>E. nitens</i>	First record for Tasmania
<i>Microsphaeropsis callista</i>	<i>E. nitens</i> and <i>E. obliqua</i>	First record for Tasmania
<i>Ophiodothella longispora</i>	<i>Eucalyptus</i> spp.	First record for Tasmania
<i>Aurantiosacculus eucalypta</i>	<i>E. obliqua</i>	First record for Tasmania

Table 9. 1 New records of fungal species found from leaf lesions of *Eucalyptus* species in Tasmania during 1998-9.

10 SOUTH AUSTRALIA - PESTS

Charlma Phillips
ForestrySA

10.1 Plantations

Pinus radiata

Sirex: There has been little evidence of *Sirex* this year in any plantations. Observation flights in May and June in the South East of South Australia found no dying trees with symptoms of *Sirex* attack. No *Sirex* emerged from billets in the 1998-99 summer period. Some *Megarhysa* and *Schlettererius* were released at several sites near Mt Burr.

Sixteen trap tree plots were established in ForestrySA plantations in December 1998. Felling and inoculation of these plots will start in July 1999.

A total of 44 million nematodes have been ordered from CSIRO. 30 million for Auspine, 12 million for ForestrySA and 2 million for CSR.

Ips: A small number of trees (30-40) at Comaum have been affected by *Ips*. These trees are *Pinus pinaster* and are adjacent to a recently clear felled area. A ground check will be carried out shortly. There has been no other *Ips* activity.

Essigella: The Essigella aphid is now widespread throughout pine plantations in South Australia. There has been severe yellowing and defoliation but there has also been severe drought stress in many areas this year. In May ForestrySA flew over the South East plantations and estimated the area showing symptoms of drought/aphid damage. Results were as follows: 15810ha lightly affected (< 5% of trees)

9358ha medium affected (5-30% of trees)

3819ha heavily affected (> 30% of trees)

making a total of 28987ha affected to some degree. Recent reports from field staff suggest that trees which have suffered even severe defoliation are now showing signs of regrowth at the tips.

Eucalypts:

Eucalypt plantations continue to be regularly attacked by Autumn Gum Moth, which is the major insect pest in plantations. Sawfly larvae also cause considerable damage in some plantations. Spraying for both these pests has been carried out in several plantations.

In April several severe frosts caused widespread damage, especially to young trees 1-3 years old. Some were so badly affected there is some doubt as to whether they will survive.

A new species of weevil (as yet unnamed) has been found attacking newly planted eucalypt seedlings in one plantation. The tiny weevils ringbark the seedlings and are extremely well camouflaged on the stems.

11 SOUTH AUSTRALIA - DISEASES

Charlma Phillips
ForestrySA

There have been no reports of any disease problems in South Australia this year in plantations of either eucalypts, pines or in native forests apart from the continuing problem of Mundulla Yellows in the Upper South East of South Australia. This occurs along roadsides and on isolated trees on farms - not just eucalypts.

MUNDULLA YELLOWS

Mundulla Yellows is a lethal disease of unknown cause that is having a significant impact on eucalypts and other native trees and shrubs in the South East of South Australia.

Symptoms begin with the yellowing of leaves on several branches, gradually spreading throughout the tree. The plant eventually displays classic dieback symptoms and within a few years dies. The symptoms were first noticed 20 years ago around Mundulla in the South East by a local apiarist. Symptoms are especially evident along roadsides and in shelterbelts and revegetation areas. No symptoms have been seen in native forests so far.

A workshop was held in September 1998 to discuss the disease. This helped to clarify some of the issues and highlighted the need for more research. Up until this time the disease had been given very little attention.

Plant pathogens such as Phytophthora and Armillaria have been dismissed as possible causes. Professor John Randles (virologist at the Waite Institute in Adelaide) has isolated a phytoplasmid which may be associated with the yellowing.

12 WESTERN AUSTRALIA - PESTS

12.1 Plantations

Pinus

Sirex monitoring continues with no current evidence of the wasp in Western Australia. Despite the dry summer for 98-99 no outbreaks of *Ips grandicollis* have been reported. The Monterey pine aphid, *Essigella californica* to date has not been detected in Western Australia. In young *Pinus pinasta* plantations rutherghlen bug (*Nysius vinitor*) has been a problem in agricultural areas.

Eucalypts

The Chrysomelid *Cadmus excrementarius* has caused significant defoliation this past season on *E. globulus*.

A new contract entomologist who is funded through the CRC, the Western Australian Industry Pest management group and directed by CSIRO will be starting in Manjimup in July 1999. The entomologist will investigate insect problems of *E. globulus* such as weevils (*Oxyops* and *Gonipterus*), spring beetles, African black beetle, autumn gum moth and Chrysomelids. It is expected this work will take three years.

12.2 Managed Natural Forests

Eucalypts

Jarrah leaf miner (JLM) research has now concluded, however opportunistic monitoring and regular mapping of expanding JLM populations (cut out boundary) north of Collie continues. The JLM outbreak receded in 1985-92. Research into *Uraba lugens* has also concluded. Results are currently being written up and include quantitative population measurements from 1986-1996. A study on the incidence of *Phoracantha acanthocera* (bullseye borer) in karri is complete and will be submitted for publication by August 1999. This study found: (1) an association with bullseye borer and incipient rot; (2) a minimum diameter preference in karri; (3) borer incidence greater in karri compared with marri; (4) a preference for dry sites. Other findings confirmed earlier work. A wider survey is now anticipated using presence/absence based on visual symptoms.

Current conservation studies include: (1) the impact of clearfelling of karri forest on invertebrates and macrofungi in litter and soil using pitfall trapping and a space for time approach; (2) the impact of logging and burning on selected invertebrate taxa in jarrah forest using the gap cutting and shelterwood silvicultural treatments; (3) fire impacts on invertebrates of red tingle forest. The tingle forest study is near completion and writing up has commenced. Preliminary findings have shown different species groups in different fire ages. Burn ages included frequently burnt areas of < 5 years, vegetation managed areas with a fire frequency of 10-20 years, and long unburnt areas > 15 years unburnt. Gondwanan fauna were found in the long unburnt areas where the understory vegetation had collapsed and deep litter layers had developed.

13 WESTERN AUSTRALIA - DISEASES

Richard Robinson (Compiler)

Department of Conservation and Land Management
CALMScience Division
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13.1 PLANTATIONS

Pinus pinaster

Shoot dieback disease (*Aureobasidium/Sydowia*) was isolated from two properties north of Perth. Trees on other properties have shown symptoms of the disease. It appears that the fungus develops at the beginning of winter with lesions (photo 1) noticeable on the newly expanding shoots. The lesions may cause the tip to die (photo 2) in extreme cases and a proliferation of shoots will develop immediately below this point. Even where the disease does not kill the shoot a proliferation of shoots will develop (photo 3). Fast growing trees appear to be worst affected. The effect of the disease on the form of *P. pinaster* is being monitored (photo 4) (R. Fremlin, CALM).

FIGURES - SEE MAIN TEXT (Page 9)

Eucalyptus globulus

Leaf spot diseases were noted as being locally severe in some plantations in the south-west during the winter/spring of 1998 (R. Fremlin, CALM).

Work under the following grants is in progress at Murdoch University.

Murdoch-Industry Collaborative Grant: Disease assessment survey of *Eucalyptus globulus* plantations in South-Western Australia (A. Maxwell, G. Hardy and B. Dell)

Small ARC: Interaction between *Endothia gyrosa* and *Eucalyptus globulus* micronutrient status and canker disease development. (G. Hardy and B. Dell)

Masters Thesis in progress at Murdoch University

The interaction of copper deficiency and disease in *Eucalyptus globulus* plantations. (L Ishaq; Supervisors B. Dell and G. Hardy)

PhD Theses in progress at Murdoch University

Mycosphaerella leaf pathogens in *Eucalyptus globulus*. (Aaron Maxwell; Supervisors, B. Dell and G. Hardy).

Canker diseases in *Eucalyptus globulus*. (Tania Jackson; Supervisors, G. Hardy and B. Dell).

13.2 NATIVE FORESTS

No new major pathological problems have been reported. Management and survey of root diseases caused by *Phytophthora* spp. and *Armillaria luteobubalia* continue to command attention.

Dieback mapping: In 1998, approximately 74 138 ha of jarrah and karri forest were mapped for the presence and predicted impact of dieback. The mapped area included 52 536 ha previously unmapped, 2 281 ha mapped less than 3 yrs previously and rechecked and 7 577 ha mapped under contract to Alcoa of Australia (G. Strelein, CALM).

Wandoo Forest

An isolated incident of canopy decline was reported in a stand of *Eucalyptus wandoo* east of Perth. Subsequent investigation suggests the decline to be primarily due to drought. Secondary factors such as phytophagous insects and twig and branch cankers (eg. *Cytospora* sp. And *Botryosphaeria* sp.) were also present (F.Tay, M. Stukely, CALM).

Honours Project in progress at Murdoch University

Incompatibility studies of haploid cultures of *Armillaria luteobubeliana* from the swan coastal plain and *E. wandoo* forest. (Chris Dunne; Supervisors, B. Shearer, CALM, Dr. Inez Tommerup, CSIRO and G.Hardy, MU)

Jarrah Forest Region

Cryphonectria cubensis has (again) been isolated from a recently dead jarrah stump. These isolates of *C. cubensis* have been added to the culture collection at Agriculture WA. Australian Isolates of *C. cubensis* are included in a paper by Myberg *et al.*(1999), Mycologia 91: 243-250 (E. Davison, Curtin University)

Dieback-resistant jarrah (*Eucalyptus marginata*): Research into the field performance of jarrah selected for resistance to *Phytophthora cinnamomi* is continuing. Earlier field validation trials were located on mine rehabilitation sites infested with *P. cinnamomi*; trials are currently being established on diseased forest sites (M.Stukely, CALM). Establishment of pilot and production seed orchards is continuing (I.Colquhoun, Alcoa, and M.Stukely, CALM). The first progeny from seed orchards are now to be grown for resistance testing (M.Stukely, CALM).

PhD Theses in progress at Murdoch University

The uptake and distribution of phosphite in *Eucalyptus marginata* and how this effects *Phytophthora cinnamomi*. (R.Pilbeam; Supervisors G.Hardy, MU, and B.Shearer, CALM).

Early disease development of *Phytophthora cinnamomi* in *Eucalyptus marginata* growing in rehabilitated bauxite mines as influenced by waterlogging and drought. (Anne Lucas; Supervisors, G.Hardy and J. McComb).

Long term survival of *Phytophthora cinnamomi* in rehabilitated bauxite mines and adjacent *Eucalyptus marginata* forest. This project is looking at chlamydospore dormancy and saprophytic growth. (Sarah Collins; Supervisors, G.Hardy, MU and B Shearer, CALM).

Karri Forest Region

A tree pulling study to determine below ground levels of *Armillaria* root disease in 1969-72 karri regrowth continues. Preliminary results suggest that in some infested stands, intense above ground survey may underestimate levels of infection by up to 15-20 % (R. Robinson, CALM).

13.3 NURSERIES

No major problems have been reported in either conifer or hardwood seedlings in nurseries.

13.4 NATIVE PLANT COMMUNITIES

Biology, ecology, pathology and control of *Phytophthora* spp.

Forty three hectares were aerially sprayed with phosphite in the 1998/99 financial year and about 4 hectares were sprayed using backpack mister or vehicle-mounted pumps. Aerial spraying to protect rare flora took place in the Stirling Range, on coastal sites near Albany and in the Ellis Brook reserve near Armadale. Ground application took place at Popanyinning to protect a DRF (declared rare flora) *Banksia*, and at the Forest Heritage Centre at Dwellingup (R. Smith, CALM).

Work under the following grants is in progress at Murdoch University.

Collaborative ARC 1997-1999: The potential role of the fungicide phosphonate to control *Phytophthora cinnamomi* in native plant communities adjacent to mining. (Investigators: Dr. G.Hardy, MU, Dr. I.Colquhoun, Alcoa of Australia, B.Dell, MU and G.Roos, MU).

Minerals and Energy Research Institute of Western Australia (MERIWA) 1997-8: The potential role of the fungicide phosphonate to control *Phytophthora cinnamomi* in native plant communities adjacent to mining. (Investigators: G.Hardy, MU, I.Colquhoun, Alcoa of Australia, B.Dell, MU and G.Roos, MU).

Honours Projects in progress at Murdoch University: Tolerance of *Phytophthora cinnamomi* to the fungicide phosphite. (Libby Burgess; Supervisors G.Hardy, MU, J. McComb, MU and I. Tommerup, CSIRO).

PhD Theses in progress at Murdoch University

Sudden death in cutflower Proteaceae. (Chris Dunne; Supervisors, G.Hardy and B.Dell).

The genetics of pathogenicity in *Phytophthora cinnamomi* the cause of dieback in native plant communities. (D. Huberli; Supervisors G.Hardy, MU, and I. Tommerup, CSIRO).

The effect of ectomycorrhizal fungi on induced resistance of specific native plant species to *Phytophthora cinnamomi*. (K.Howard; Supervisors G.Hardy and B.Dell)

The control of *Phytophthora cinnamomi* by the fungicide phosphite in native plant communities on the south coast of Western Australia. (S. Barrett; Supervisors, G.Hardy, MU, and B. Shearer, CALM).

The effects of phosphite on pollen development, flowering, seed set and viability on native plant species. (M. Fairbanks; Supervisors J. McComb and G.Hardy).

13.5 DIAGNOSTIC WORK

Between July 1998 and June 1999, a total of 2112 samples was processed for *Phytophthora* identification by CALM's Vegetation Health Service (VHS). *P.cinnamomi* was detected in 723 samples, *P.citricola* (67), *P.cryptogea* (9), *P.megasperma* (1), *P.drechleri* (1), and *P.spp.*(26), (82, identification currently not completed). There were 33 samples (sandalwood, pine, eucalypt and others) sent to the VHS for general diagnosis in this period (F.Tay, CALM).

14 NEW ZEALAND - PESTS

John Bain

ForestResearch (New Zealand Forest Research Institute)

14.1 Plantations:

Pinus radiata:

Essigella californica (Aphididae), which was first found in New Zealand in February 1998, is now found throughout the North Island and in Canterbury in the South Island but is generally not associated with any visible damage other than minor spotting on the needles and numbers are generally low. However in May very high populations on *Pinus radiata* were reported at two small forests in the

southern North Island and were associated with needle cast. *Cyclaneusma* needle-cast was also common in the stands so the role of the aphid was unclear. The situation is being monitored.

A dry, mild winter in 1998 resulted in high *Pineus* spp. (Adelgidae) populations, particularly in Canterbury in the South Island. A drier than usual summer has helped maintain these populations at a high level.

Eucalyptus species

During the summer of 1998/99 a survey of eulophid galls on *Eucalyptus* spp. was carried out. The following is a summary of what was found.

Ophelimus eucalypti (Eulophidae), which has been present in New Zealand since the 1920s, is distributed throughout the country and is commonly reared from *E. globulus*, *E. nitens* and *E. viminalis*. It is still uncertain whether the specimens from the midrib and branch galls, and the small sandpaper type galls on juvenile leaves of these hosts are all the same species. This is still under investigation.

Another species of *Ophelimus* (designated sp. b) is distributed throughout New Zealand on *E. saligna*, *E. botryoides*, *E. grandis* and *E. deanii*. *Eucalyptus grandis* leaves which have been subjected to heavy ovipositing tend to be shed earlier and often the only galls that develop are very small, giving the galled leaf a quite different appearance to those of galled *E. saligna* and *E. botryoides*. The adults that emerge from these small galls are almost always males. This may suggest that *E. grandis* leaves often do not support female development (with their probable greater nutritional requirements) through to pupation and emergence. This hypothesis is currently under investigation.

The survey has also resulted in the recognition of at least two more species of Eulophidae. The most abundant species, a distinct yellow and black *Aprostocetus* species has emerged from stem and leaf galls of *E. globulus* (Northland to Wellington), from *E. globulus* sandpaper galls (Marlborough), from *E. kitsoniana* galls (Wellington), from *E. grandis* leaf galls (Wellington), and *E. saligna* and *E. botryoides* leaf galls (throughout the North Island). This distribution combined with the known biology of other *Aprostocetus* species strongly suggests that it is parasitic on all gall-forming *Ophelimus* species found in New Zealand.

Another eulophid, a metallic looking *Chrysonotomyia* species, has been collected from leaf galls of *E. grandis*, *E. saligna* and *E. botryoides* (throughout North Island). It is probable that this species is also a parasitoid of *Ophelimus* sp. b.

Plans for the next year include determining the parasitism status of *Aprostocetus* and *Chrysonotomyia*, describing the gall induction mechanism of *Ophelimus* sp. b, and using morphological and molecular techniques to elucidate the species of *Ophelimus* present in New Zealand.

During a routine port environs survey in January 1999 *Acrocercops laciniella* (Gracillariidae) (the blackbutt leafminer) was found in New Zealand for the first time. It was found on *Eucalyptus leucoxylon* at the Aviation Golf course adjacent to the Auckland International Airport. Further surveys revealed that it is reasonably widespread in Auckland. Other hosts recorded in Auckland were *E. viminalis*, *E. macarthurii* and *E. botryoides*. Eradication was not considered a feasible option.

In Australia *Acrocercops laciniella* is widespread from southern Queensland to Tasmania. Its main host is believed to be *E. pilularis*, and it has periodically caused severe damage to *E. pilularis*, particularly between July and September, in coastal NSW¹ The insect attacks both mature and coppice foliage destroying all green tissue in the leaves, causing them to curl and giving the tree a burnt appearance.² The damaged trees regrew their foliage within 3 months and appeared to recover. *A. laciniella* has also been commonly reared from mines on *Angophora floribunda*, *A. costata*, and *E. saligna*. In Tasmania it

¹ Elliot, H.J.; Ohmart, C.P.; Wylie, F.R. (1998): "Insect Pests of Australian Forests; Ecology and Management". Inkata Press, Melbourne.

² Moore, K.M. (1963): Two species of lepidopterous leafminers attacking *Eucalyptus pilularis* Smith. Australian Zoologist 13: 46-53.

is common on the juvenile foliage of *E. nitens*, *E. globulus*, *E. regnans*, and *E. obliqua*.³ More recent host records from eastern Australia include: *E. viminalis*, *E. acmenoides*, *E. dives*, *E. bridgesiana*, *E. rossii*, *E. globulus* ssp. *pseudoglobulus*, and *E. macrorhyncha*.^{4 5}

In Australia a number of parasitoids of *Acrocercops laciniella*, including Braconid and chalcidoid wasps, have been reared from its leaf mines.⁶ *Acrocercops alysidota* has been in New Zealand since about 1916 (on *Acacia melanoxylon*) and is parasitised by the eulophids *Diaulomorpha* sp. and *Cirrospilus* sp.⁷ The host range of these parasitoids is currently being investigated.

Cardiaspina fiscella (first found in New Zealand in May 1996 near Auckland International Airport) continues to expand its range and have a severe effect on its main hosts, *Eucalyptus saligna* and *E. botryoides*. It has now spread as far north as Whangarei and east to the coastal Bay of Plenty. There is a single record on *E. camaldulensis* in Whangarei. An apparently effective parasitoid has been indentified in New South Wales and permission has been received to import it into quarantine in New Zealand.

Uraba lugens (Nolidae) (first found June 1997) is still apparently confined to a very small area at Mt Maunganui. The last time larvae were seen was in January 1999. Further intensive surveys are planned for spring this year.

Acacia species

In late May 1999 a well established population of the painted apple moth (*Teia anartoides* (Lymantriidae)) was found in the suburb of Glendene, Auckland. It was found by a member of the public. The Ministry of Agriculture and Forestry immediately initiated a delimiting survey to assess the extent of the population. The moth is apparently confined to an area with a radius of about 700 m. *Acacia* spp. are the principal hosts but the caterpillars feed on a wide range of plants including *Pinus radiata*. This is regarded as a very serious incursion and the population is the target of an eradication attempt using ground-based spraying and tree removal. There is much debate in New Zealand about the extent of the areas surveyed and the fact that aerial spraying is not being used in the eradication programme.

Dicranosterna semipunctata (Chrysomelidae) which was first found in New Zealand (Auckland) in April 1996 has extended its range to Orewa in the north and also in the south to northern Waikato. As a result of a pest risk analysis of *D. semipunctata* on *Acacia melanoxylon* it has been decided to explore the possibility of introducing parasitoids from Australia. Initially this work will centre around Armidale, NSW.

14.2 Urban and rural:

In April 1999 during a routine port environs survey in Auckland a leaf-mining caterpillar was found on *Banksia integrifolia*. This was the first record of a leaf-miner on *Banksia* in New Zealand. Samples were reared and the moth subsequently identified as *Stegommata sulfuratella* (Lyonetiidae). Further searches have shown that although not very numerous, the species is quite widespread in Auckland and eradication was not considered an option. Because of its hardiness and salt-tolerance *B. integrifolia* is a valued amenity tree in New Zealand. Its yellow flowers are also a valuable nectar source for many native New Zealand birds such as tuis and bellbirds.

The eradication campaign for Dutch elm disease I Auckland continues. In the 1998/99 season an extremely large number of *Scolytus multistriatus* were trapped but none of them were carrying *Ophiostoma novo-ulmi*. No trees exhibiting symptoms of Dutch elm disease were in three surveys all known elms in Auckland. One tree (which died because of severe root disturbance) yielded *O. novo-ulmi* from 4-year-old wood (ie. the infection was contained). This prompted a study involving the

³ R. Bashford, pers. comm

⁴ Moore, K.M. (1966): Observations on some Australian forest insects, 22. Notes on some Australian leaf-miners. Australian Zoologist 13: 303-349.

⁵ M. Horak, pers. comm

⁶ R. Bashford, pers. comm.

⁷ Appleton, C. (1998): Parasites of the leaf miner *Acrocercops alysidota* (Lepidoptera: Gracillaridae) (sic). The Weta 21: 20-21

sampling of branch material from nearly 100 elms. Cultures were taken from any stained wood found in the branches but no *O. novo-ulmi* was isolated. A far bigger survey for this contained (or asymptomatic) infection is planned for the coming season.

Acknowledgement: I thank my colleagues in Forest Health for providing information for this report.

15 NEW ZEALAND - DISEASES

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Summarised from a data table prepared by L. Bulman from the *Forest Research* Forest Health Database, from articles in issues of Forest Health News (P. Bradbury, L. Bulman, M. Dick, K. Dobbie, I. Hood, C. Inglis, G. Ridley, B. Rogan, B. van Boven), and from *Forest Research* Forest Health Advisory Services operational notes (R. Morgan and Forest Health Advisers).

15.1 Introduction:

In the year from 1 July 1998 to 30 June 1999, records of disorders of forest trees totalled in excess of seven thousand, slightly fewer than those in the previous year. Dry conditions during the summer, especially in eastern parts of the country, prolonged the effects of drought experienced during the previous year, though substantial rain fell towards the west during October. With substantial general rain in autumn (March and April), dry conditions eased, and some parts of the country were affected by stormy weather. The mild winter may have been responsible for an increase in foliage diseases in *Pinus radiata* stands in some areas.

15.2 Plantations:

Pinus radiata:

Foliage:

There were 742 records of *Dothistroma pini* needle blight, significantly greater than in the previous year, following a warmer than usual winter. Greatest numbers were from the central North Island (including Auckland and the King Country), the northern west coast of the South Island (including Nelson), and Southland. High disease levels occurred between August and January, initially on the western side of the country which had suffered less from dry conditions. Control spraying was also carried out in Northland, where localised infection centres were again appearing in May and June.

Cyclaneusma minus needle cast records were substantially greater in number (844) than in the previous year. Highest numbers came from the central North Island and Nelson, and there were also reports between July and November on the South Island West Coast and Taranaki, on the western side of the country, and in the southern North Island, Canterbury and Southland. Early symptom expression hindered the pre-aerial spraying surveys for *Dothistroma pini* incidence in some forests. Out-of-season needle cast in Southland during May was also attributed to *Cyclaneusma minus*.

In addition, severe defoliation occurred during late winter and spring, 1998 (August-December), in five- to 24-year-old stands of *P. radiata* in parts of the western North and South Islands, and in the northern and central North Island, following prolonged rainfall and unseasonably warm temperatures. Crowns appeared red-brown and where most severe, complete defoliation occurred. Black fungal fruit bodies produced on khaki-coloured bands on affected needles belonged to common litter-decomposing fungi such as *Strasseria geniculata*, *Strasseria* sp., *Lophodermium conigenum*, *L. pinastri*, *Ceuthospora* sp., *Pestalotiopsis* sp., and *Phomopsis strobil*. This disease was attributed to primary infection by *Cyclaneusma minus*, which occurs during autumn and winter, followed by a greater than usual invasion of secondary fungi due to the mild conditions. Trees with thin crowns were still

noticeable as late as February, and an effect on growth increment is likely in worst affected stands. It was anticipated that trees would recover when rainfall patterns returned to normal. However, in at least one severely defoliated stand, dieback subsequently occurred as a result of invasion by *Sphaeropsis sapinea* (synonym, *Diplodia pinea*). New outbreaks were reported in some stands in Northland during May and June, but it remains to be seen if the problem will recur in the coming year.

The condition known as upper mid-crown yellowing, attributed to a magnesium and potassium nutrient imbalance, was less in evidence this year, with a total of 487 records. These were mainly from the central North Island, Gisborne on the North Island east coast, Nelson, and from Southland (a lower incidence reported in Southland was not borne out by the number of records).

Stems, shoots:

Reports of Diplodia dieback (*Sphaeropsis sapinea*) totalled 209, with most records being from the central and eastern North Island and northern Canterbury. Some Diplodia dieback was induced by drought stress, and two records from the Wellington and Wairarapa regions were related to storm damage.

Damage by the introduced possum (*Trichosurus vulpecula*) was recorded on 593 occasions, slightly fewer than in the previous year. Most records were from the central and eastern North Island, Coromandel, and Wanganui regions. There was one report of damage by the native parrot, kaka (*Nestor meridionalis*), from Whirinaki in the central North Island.

Roots:

Records of Armillaria root disease (*Armillaria novae-zelandiae* and *A. limonea*) numbered 443, about the same as last year, most being from the central North Island, Coromandel, Nelson, and Southland. Most records were of low-incidence mortality in young stands, since chronic infection is not readily identified during surveys. There was a report of a "G.B. fungus" root disease centre (*Dextrinocystidium sacratum*; synonym, *Peniophora sacrata*) at Cable Bay, Nelson. Pockets of mortality in Marlborough were attributed to *Leptographium* and *Phytophthora*.

Other:

Drought again affected many stands, already stressed from dry conditions during the previous summer, particularly in the eastern parts of the country during spring and summer (from September on). By February, conditions were also very dry on the South Island West Coast, Nelson, and Southland. In Canterbury (eastern South Island), warm northwesterly foehn winds prior to Christmas resulted in localised high mortality in some two- to five-year-old *P. radiata* stands on silty or sandy soils. Other stands with limited spring growth coped with these conditions, but continuing soil drying led to defoliation and leader dieback in February associated with infection by *Sphaeropsis sapinea*. Mortality also occurred particularly in younger stands on lighter soils. Boron deficiency symptoms were also more prevalent on two- to four-year old trees, apparently enhanced by the dry conditions. Apart from mortality, a high incidence of dieback and multiple leaders in surviving trees will affect thinning selection and top log quality. Needle casting on ridges on the east coast of the North Island was attributed to drought.

In addition to the upper mid-crown yellowing syndrome (see above), other nutrient deficiency disorders were reported, mainly from the central North Island and Nelson, including those of phosphorus, magnesium, and boron (also east coast North Island). Symptoms attributed to calcium toxicity were reported from Hawkes Bay.

Damage was caused by fire at Hira Forest in the South Island in August. Frost caused shoot tips to droop in August after premature mild conditions in one central North Island forest, and terminal hypertrophy and needle shedding in another forest during September was attributed to weather and site conditions possibly affecting particular clones.

Stormy weather in February caused damage to mature pine trees in Northland. Heavy rainfall in spring and summer appears to have been the cause of localised group mortality associated with waterlogged

sand above a clay pan in a far northern coastal dune forest.

Douglas fir (*Pseudotsuga menziesii*):

Records of Swiss needle cast disease (*Phaeocryptopus gaeumannii*) totalled 49 during the past year. Douglas fir planted on a site previously stocked in *Pinus radiata* heavily affected by *Armillaria* root disease in Fiordland was reported to be showing no mortality.

Younger age classes of Douglas fir suffered during dry, windy conditions in spring and early summer on the Canterbury plains (eastern South island). Many seedlings and saplings were reported dead in September after foliage had turned a red-brown colour. Drought also affected an overstocked stand of Douglas fir in Southland. Branch and leader dieback was reported on Douglas fir in the Clyde area in the South Island.

***Eucalyptus* species:**

As in previous years, a high number of leaf spot fungi were recorded on eucalypt species throughout the year. These included *Aulographina eucalypti* (40 records), *Fairmaniella leprosa*, *Mycosphaerella* species (particularly *M. cryptica*), *Pachysacca pusilla*, *Pseudocercospora eucalyptorum*, *Septoria pulcherrima* (synonyms, *Kirramyces eucalypti*, *Phaeophleospora eucalypti*), and *Sonderhenia eucalyptorum*. In most cases these fungi had limited host impact, but *S. pulcherrima* continued to cause a severe leaf cast disease of *Eucalyptus nitens* in the coastal Bay of Plenty region, and was also damaging in Northland, and *Aulographina eucalypti* and *Trimatostroma bifarrum* were associated with defoliation of *E. regnans* and *E. fastigata* in the central North Island following wet weather. Two species of *Mycosphaerella* new to New Zealand were recorded on *E. saligna* in the eastern Bay of Plenty region, and on *E. muelleriana* in Northland, respectively (that on *E. saligna* may have been previously recorded in 1983). The identities of these fungi are being determined.

Substantial cankering and dieback developed in a South Island West Coast stand of *Eucalyptus nitens*, this year, following the discovery of the problem in 1998. Trees are 14- to 19-years-old, and the area affected encompasses 60 ha. A species of *Sarcostroma* which is consistently associated with the cankers was first found in the central North Island in 1986, and has also been recorded from Nelson. No damage was present on adjacent *E. regnans* and *E. obliqua* trees.

Dieback and mortality losses occurred in stands of *Eucalyptus* and *Acacia* species (particularly *E. nitens*) exposed to warm dry winds during drought conditions in Canterbury (eastern South Island) early in summer. Dieback in spring of various eucalypt species (*E. grandis*, *E. delegatensis*, *E. botryoides*, and *E. saligna*) in Wainuiomata and along the Hutt River (Wellington area), possibly due to increased wind exposure, was associated with *Platypus* attack and a *Cytospora* species. In many cases leaves were still present, indicating rapid death.

Cypresses:

Young stands of *Chamaecyparis lawsoniana* established in a number of locations showed shoot tip death associated with a species of *Sarcostroma*. There was some concern that the problem may lead to bushiness and a loss of apical dominance.

15.3 Nurseries:

As occurred last year, a number of forest nurseries were not inspected for economic reasons. Few problems were reported in those examined.

Swellings produced at the base of *Pinus radiata* seedlings in a central North Island nursery have been attributed to a chemical cause. Root rot associated with infection by *Fusarium* and *Phytophthora* occurred in a nursery near Nelson.

15.4 Urban and rural:

The mild winter upset the timing of leaf shedding and new bud production on some deciduous trees this

year.

The programme to eradicate Dutch elm disease in Auckland continued during the 1998-99 season. The causal fungus, *Ophiostoma novo-ulmi* was not isolated from 14.5 thousand *Scolytus multistriatus* beetles trapped between October and April. The fungus was cultured from four-year-old wood in the one diseased tree found during this year's surveys, indicating old infection, but infection has not been found in current year's wood since the 1995-96 season. Further attempts were made to poison coppice elm shoots at the site in Napier where the disease is present. It was theorised that *O. novo-ulmi* may have been carried to Napier with machines from Auckland used to dig sewer lines. The beetle that vectors the disease is not yet present in the Napier region.

Cypress canker disease (species of *Seiridium*) was extensive in rural *Cupressus* woodlots and shelterbelts in warmer localities (eg. around Auckland and Tauranga). A survey has been initiated to assess the incidence of the disease in rural cypress stands of different types throughout the country. One of the cypress canker fungi, *Seiridium unicorne*, was found for the first time on cankered branches of Californian redwood (*Sequoia sempervirens*).

The rust fungus *Uromycladium alpinum* was recorded for the first time in New Zealand on *Acacia dealbata* in Gisborne and Northland. However, this fungus may not be newly introduced, and it is thought that damage will not be as severe as that caused by *U. notabile*.

A species of *Cryptosporiopsis* was found on dead branches and lesions of *Acer davidii* trees in Central Park, Wellington, and species of *Phoma* and *Phomopsis* were obtained from a specimen of the Australian *Dacrydium franklinii* in the Wellington Botanical Gardens. *Cylindrocladium spathulatum* (possibly synonymous with *C. ilicicola*) was identified on box hedges (*Buxux* sp.) in the Auckland area.

Dying ornamental puka trees (*Meryta sinclairii*, native to the Three Kings and Hen and Chicken Islands) at Tauranga were found to be growing in heavy, wet clay soils infested with *Phytophthora cactorum*.

Armillaria root disease is very common in urban gardens, and was active in the Christchurch Botanic Gardens, this year. Television coverage in April highlighted the problem in the Gardens, and promoted injections of a *Trichoderma* product as a cure. There is some scepticism about the effectiveness of this treatment, since rigorous experimental evidence is limited.

In December-January strong offshore northeasterly winds caused salt scorching to foliage of a variety of exotic tree species up to 10 km inland in the Bay of Plenty region from Katikati to the Coromandel Peninsula, and in February in the Waipu area of Northland. Drought affected a number of exotic urban trees during summer in eastern parts of the country and in Southland. Damage from waterlogged soil occurred in some shelterbelts of *Pinus radiata* and oak (*Quercus* sp.) in the southern North Island.

15.5 Native vegetation:

Decline in beech (*Nothofagus*) was reported in the Cashmere area (Canterbury) in October, and beech dieback associated with stem boring and fungal leaf spotting was observed near Kawatiri Junction in March-April. Crown dieback occurred in some pohutukawa trees (*Metrosideros excelsa*) near Napier, and some old totara trees (*Podocarpus totara*) showed dieback in localities in Northland (a species of *Pestalotiopsis* was isolated).

Some new records included a species of *Mycosphaerella* on leaves of rangiora (*Brachyglottis repanda*), and a species of *Fusarium* from *Phyllocladus glaucus* in the Otari Plant museum, Wellington. Unexplained distortion of tree fern fronds (*Cyathea* sp.) was also reported this year.

There was speculation late in 1998 that the phytoplasma causing flax yellow disease in *Phormium tenax* has spread to other native plants such as cabbage tree (*Cordyline australis*), where it is responsible for the recent decline. Much more evidence is needed.

15.6 Organisational:

The Forest Health Advisory Committee has been renamed the Forest Biosecurity Advisory Committee. Its purpose is to provide a forum for the forest sector to enable discussion of biosecurity services and initiatives, and to provide advice to the Minister of Biosecurity. It also facilitates the contract for surveillance services to commercial forest growers.

The Forest Health Surveillance Unit, now known as the Forest Health Advisory Services, was purchased from the Ministry of Agriculture and Forestry, and is now a discrete self-contained entity within *Forest Research*. Thus, after an absence of more than ten years, forest health surveillance has once again come within the jurisdiction of the old Forest Research Institute. This year Forest Health Advisors carried out surveillance in indigenous forests under a contract with the Department of Conservation, besides their more traditional role in exotic pine forests.

The Forest Health Research Collaborative met in November and May. This body is open to anyone with an interest in forest health, and facilitates interaction between forest owners and science providers. A prime function of the group is to allocate research funding on relevant topics. Meetings are divided into a business session, a technical session (which may include topical science presentations), and a field trip.

16 QUARANTINE - AUSTRALIA - DISEASES

Sharan Singh
AQIS

Nil report from me for this year.

You may like to mention that AQIS has changed the importation conditions for pine and Douglas fir seed. You may consider including the new conditions in the report.

17 QUARANTINE - NEW ZEALAND - DISEASES

Report compiled by Geoff Ridley, New Zealand Forest Research Institute Ltd

17.1 Interceptions: For the year ending 30 June 1999 some 111 quarantine samples were received from the Ministry of Agriculture and Forestry (MAF) quarantine inspectors. The source of these samples were - 38 (34%) from used vehicles, debris in or on containers 33 (29.5%), wood packaging 17 (15.5%), used machinery 4 (3.5%), timber 7 (6.5%), dunnage 1 (1%), debris 0, and miscellaneous 11 (10%). The geographic area of origin of these samples were - Asia North 44 (39.5%), Asia South-east 7 (6.5%), Asia South-west 2 (2%), Australasia 29 (26%), Pacific 3 (2.5%), North America 9 (8%), Europe 10 (9%), Africa 1 (1%), South America 1 (1%), and unknown 5 (4.5%).

The total number of samples received in 1997-98 of 195 was significantly down on the 459 received in 1996-97. This was accounted for by the winding up of the used car import survey in late 1997. The number of container samples was also down on the 58 samples received in 1996-97 due to a container survey undertaken that year. However, the number of samples continued to decline from 195 last year to 111 this year (1998-99). This could reflect an increase in vigilance on the part of the exporters but it is more likely that the restructuring of the Ministry of Agriculture and Forestry has disrupted continuity of collecting and may have demoralised staff.

17.2 Forest Research Quarantine Facility: *Forest Research's* new quarantine building was opened by Hon John Luxton, Minister for Biosecurity, on 13 May. The state-of-the-art facility was built to comply with the new MAF standards for Plant Quarantine Diagnostic Laboratories and Operators and for Invertebrate rearing facilities. At this time the *Forest Research* facility is the only one in the country to have been registered under the Plant Quarantine Diagnostic Laboratories standard.

The facility will provide two main services:

- In the Plant Pest Diagnostic Laboratory, staff will identify insect and fungal pathogens that have been intercepted at our borders.

- Invertebrate Quarantine and Containment rooms will be used to rear pests and biological control agents in containment.

Thus *Forest Research* will be able to continue to identify potential forest pests, assess the risk they pose, determine their potential geographical range and host preferences, rear intercepted pests under extremely secure conditions to support the development of control options, and rear and test natural enemies of any pest that has gained a foothold here.

17.3 Significance to Forestry Quarantine of Contaminants on the External Surfaces of Shipping Containers: A sample, comprising 3681 shipping containers, were selected randomly from containers landed at the ports of Auckland, Wellington and Lyttelton between September 1997 and May 1998. Each container was placed on a frame and all six sides were examined for the presence of soil, plant, animal or inorganic matter. Isolations for fungi were made from soil samples from 1150 containers, and nematodes and other soil animals were extracted from 347 soil samples. All plant material was examined for the presence of pathogens. Any insects, spiders and other animals were identified as far as possible and their pest status determined. A container was classified as 'quarantinable' if any of the contaminants found included viable animals or fungi belonging to genera which include plant pathogens or parasites. Of the 3681 containers examined, 2240 (61%) carried no contaminants, 580 (16%) carried non-quarantinable contaminants and 861 (23%) carried quarantinable contaminants. Among the quarantinable contaminants were pathogenic species of *Fusarium* and egg masses of the gypsy moth (*Lymantria dispar*). The quarantinable contamination rate varied from region to region, for example, it was 13.7% for containers originating from Korea, Taiwan and Japan, 20.9% for Northern Europe, 21.2% for North America, 28.3% for Australia, 33.2% for South-east Asia, 47.5% for the Pacific Islands and 50% for South Africa. There were no regional differences in the proportion of quarantinable contaminants to the total member of contaminants and no differences in the quarantinable contamination rate were found for different cargo types or for different container types. The study concluded that the nature and the frequency of occurrence of contaminants on the external surfaces of shipping containers represent a substantial risk to forestry in New Zealand.

17.4 Pitch Canker and Seed Import Regulations: In March of this year two new import health standards for *Pinus radiata* and *Pseudotsuga menziesii* seed were released for comment by the Ministry of Agriculture and Forestry. These standards include considerable input from *Forest Research* and contain a list of countries and states which are considered to be free of pitch canker (*Fusarium subglutinans* f. sp. *pini*). Importations from the listed countries and states will require an import permit, a phytosanitary certificate confirming the disease free status of the exporting country, and fungicidal treatment. Importation from countries and states not listed will be required to be grown for one season in a high security quarantine facility. This is only commonsense, and importers of seed should be sourcing seed from reputable seed merchants who can prove that their seed is from disease free areas. On the down side the import health standards are all-encompassing documents which included directives on pests, diseases and weed seed contaminants, resulting in twenty-one pages of MAF-speak to wade through.

17.5 Dutch Elm Disease: This season's pheromone trapping programme for *Scolytus multistriatus* caught 14,499 beetles between the end of October 1998 and the end of April 1999. This is a considerable increase from 4,246 beetles caught the previous season. None of the beetles were found to be carrying *Ophiostoma novo-ulmi*. Over the last three seasons 21,236 beetles have been trapped and *O. novo-ulmi* has been isolated from only two. One infected tree was found this season but the fungus was isolated from 4-year-old wood indicating an old infection rather than a recent one. The eradication campaign is progressing well and the last elm with infection limited to the current wood was discovered back in the 1995/96 season.

17.6 Risk Associated with Air Cargo and Air Containers: Air cargo is a pathway by which exotic insects and fungi can enter New Zealand. For example, *Phylacteophaga froggatti* (eucalyptus sawfly), *Cardiaspina fiscella*, and several eucalyptus leaf spot fungi were first detected in the Auckland airport environs. These organisms very probably entered the country on plant debris associated with air cargo.

A study funded by MAF to determine the forestry quarantine risk associated with air containers, and their contents, by inspecting randomly selected containers is under way. Stage one of the study was to conduct a pilot survey at Auckland airport, its outcome will determine how many containers need to be sampled in a full survey to provide statistically valid results and this has now been completed. Of the

102 containers examined for items of quarantine significance 30% contained contaminants. In nearly all cases the contaminant, soil and debris, were on the container surface, or loose inside the container, rather than carried with the cargo. Both *Phytophthora* and *Ophiostoma* species were isolated from contaminating soil samples. Based on the pilot a full study of 1000 containers from Auckland, Wellington and Christchurch airports has commenced.

17.7 Western Gall Rust: The recent western gall rust scare in Tasmania gave *Forest Research* the opportunity to see how such an incursion would be recognised and responded to. In anticipation of such an incursion occurring in New Zealand a resource document had been compiled in 1996. It was gratifying to see that the Tasmanians followed a similar path to that outlined in this document. At the time of writing the New Zealand document identification using DNA technology was not considered appropriate as the basic knowledge and expertise were lacking. It was also felt that as the work had to be done overseas this would put it out of our control. In the last three years the expertise has been developed in the USA. However, the Tasmanian experience justified our conclusion and control was lost especially in dealing with the USDA to obtain entry permits for material into the USA. At present *Forest Research* is developing DNA technology to aid in the identification of *Fusarium subglutinans* f. sp. *pini* and this will be extended to cover other overseas pathogens in the future.

17.8 New Introductions:

Calonectria spathulata - A leaf and stem blight on box hedges was observed in several parts of Auckland in the autumn/winter of 1998. The fungus was identified, on the basis of a *Cylindrocladium* asexual stage, as *Calonectria spathulata* (anamorph *Cylindrocladium spathulatum*) by the MAF Plant Protection Centre. Apparently only cosmetic damage was done to the box plants. This fungus was only known from Brazil and MAF could only speculate whether it was a native recently adapted to box or an incursion. *Cylindrocladium* is an extremely difficult genus and inquiries in Brazil indicate that there is a great deal of scepticism there as to whether this is indeed a real species. Correspondence indicates that *C. spathulatum* may be the same as the more common *C. ilicicola* which has a much wider distribution and host range (including *Buxus* sp.). This fungus was considered to be of concern to forestry as it is a pathogen of eucalypts in Brazil.

Mycosphaerella sp. - A *Mycosphaerella* was found in late 1998 on samples of *E. saligna* from forests in the eastern Bay of Plenty and from one forest in Northland. It was first collected from 1 to 2-year-old trees on leaves also affected with other foliar pathogens, and subsequently found on suppressed leaves of mature trees. This species does not exactly match any of the described species of *Mycosphaerella* on eucalypts. It is possible that some of the current species descriptions are too narrow at present and that, with expansion of the species concepts, it will find a slot among those already already described.