

22 April 1985

TO: ALL MEMBERS OF R.W.G.7

Attached is the report of the meeting held in March 1984. For those who did not attend I am including copies of the papers presented to the meeting.

Two Recommendations arose from the meeting and these were distributed to DORC members immediately following the meeting. A response to these Recommendations was provided by the Chairman of the July 1984 meeting of the Forest and Forest Products Pests and Diseases Committee, this response was circulated to all members of RWG7 on 1 October 1984. A preliminary report of the March 1984 RWG7 meeting was supplied to DORC members prior to their meeting in October 1984. That report contained the Recommendations in full, together with abstracts of topic reports and a condensed version of the complete topic reports (the condensed version was in fact little different from the full version given here, and ran to ten pages).

The next meeting, probably at Coffs Harbour mid-1986, is expected to include the following topics for major discussion:

- (i) Quarantine matters
- (ii) *Phytophthora* research proposals
- (iii) Disease risks associated with movement of planting material between states.



J.D. THORNTON  
Secretary  
RWG 7

RESEARCH WORKING GROUP NO. 7 - FOREST PATHOLOGY

REPORT OF SIXTH MEETING

BURNIE 27-29 MARCH 1984

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HELD AT

THE BURNIE CIVIC CENTRE

TASMANIA

27-29 MARCH 1984

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1. PARTICIPANTS

Representing coordinator

Mr K.C. Felton                      Forest Commission of Tasmania

Members

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Dr G.A. Kile	CSIRO Division of Forest Research (Tasmania)
Dr N. Malajczuk	CSIRO Division of Forest Research (WA)
Dr G.C. Marks	Victorian Department of Conservation, Forests and Lands
Dr K.M. Old	CSIRO Division of Forest Research (Canberra)
Dr C. Palzer	Forestry Commission of Tasmania
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Dr B.L. Shearer	WA Forests Department
Mr J.A. Simpson	Forestry Commission of NSW
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Mr J. Walker	NSW Department of Agriculture
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Observers

Dr C. Beadle	CSIRO Division of Forest Research (Tasmania)
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<sup>1</sup> Chairman  
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## 2. RECOMMENDATIONS

### 2.1 Collections of micro-organisms of importance to forestry

#### Introduction

Collections of specimens and living cultures of plant parasitic micro-organisms are essential in identifying the causes of plant diseases. In Australia, several collections exist which provide an identification service of importance to both agriculture and forestry. Recently, Standing Committee on Agriculture has endorsed some of these as National Collections. The National Collections of Plant Pathogenic Fungi is composed of the three herbaria within the State Departments of Agriculture at Rydalmere, N.S.W. (the major component) and Burnley, Vic. and the Department of Primary Industries at Indooroopilly, Qld. The National Collection of Plant Pathogenic Bacteria is located at Rydalmere and the National Collection of Plant Pathogenic Nematodes at Burnley. These collections all contain specimens and living cultures obtained throughout Australia, and some also have extensive specimen collections from overseas. They are already extensively used by forest workers throughout Australia for identification of many forest pathogens.

In addition, there are some other collections, such as those within the CSIRO Division of Chemical and Wood Technology that are not at present included within the concept of the National Collections.

It is recommended that

2.1.1. DORC inform Standing Committee on Forestry of the importance of National Collections to forestry and suggest that they contact Standing Committee on Agriculture on this matter.

2.1.2. The collections housed within the CSIRO Division of Chemical and Wood Technology be also incorporated within the National Collections as the National Collection of Wood Rotting Fungi.

2.1.3 DORC be informed that this is one example of an area of work of common interest to agriculture and forestry and that on several other matters, for example, quarantine, joint consideration by SCF and SCA would be of great benefit to plant science in Australia.

2.1.4 The need of forestry in the future could best be served by the location of a fungal taxonomist specialising in pathogens of native and exotic trees at Rydalmere. The position should be jointly funded on a long tenured basis by State Forestry organisations and CSIRO.

## 2.2 Quarantine

### Introduction

Several recent events have raised serious concern about apparent loopholes in the operation of plant quarantine in Australia. The importation of seed of *Eucalyptus* spp. - from India, South Africa and Brazil - creates a serious risk of importing damaging diseases of *Eucalyptus* and other

Myrtaceae. The bulk importation of conifer bark from New Zealand and west coast of North America presents a high risk that insect pests and diseases of *Pinus* and other conifers could enter Australia. The import of cultures of wood-rotting fungi for cultivation of edible fruiting bodies and the presence of Vietnamese wooden boats (containing wood inhabiting fungi and insects, straw and foodstuffs) on the northern Australian coasts are two other instances of quarantine loopholes potentially serious for Australian forestry and agriculture.

It is recommended that

2.1 DORC brings these matters to the urgent attention of SCF and request SCF to raise them with the Commonwealth Department of Health.

2.2 DORC request Forest Pest and Diseases Committee to convene, as a matter of urgency, a meeting of selected representatives of RWG 7, RWG 8, and appropriate management personnel together with representatives from Plant Quarantine to discuss these matters and to seek representation from the appropriate agricultural committees so that the whole matter of plant quarantine can be fully discussed.

3. OPENING

MR K.C. FELTON (Forestry Commission of Tasmania) welcomed the participants to Tasmania on behalf of the Commission. He then apologised for Mr J.J. Havel, Co-ordinator for RWG7, who was unable to attend.

Apologies were conveyed via the Chairman, from Dr W.A. Heather, Prof. J. Brown, Mr S. Navaratnam, Dr L. Bolland and Dr J. Tippett.

Dr D. de Little (Associated Forest Holdings Pty. Ltd.) was then introduced to the participants. He gave a brief summary of the local forests, climate, geology and diseases. Though leaving the meeting immediately afterwards Dr de Little was a key figure in the events of the field day (see 5. REPORT OF FIELD DAY) and joined the group again during the last session of the meeting for discussion of matters arising during the field day.

4. SECRETARY'S INTRODUCTORY REMARKS (primarily for the information of those members not attending)

The format of this meeting differed somewhat from previous meetings. On this occasion the Chairman chose to depart from previous procedure and discuss individual topics of importance (topics compiled by telephone conversations with members prior to the meeting) rather than having full reports taken from organisations and individuals. During the meeting anyone with relevant information was able to contribute to discussion of the particular topic, in the later stages of the meeting the person most involved with the topic produced a handwritten report from what had taken place during the meeting. Hence with the eighteen topics presented in

Section 6 of this document, the person whose name appears after the heading was responsible for the written report, though several other members may have contributed to the earlier discussion. The reports were finally presented orally to the meeting and agreed upon as adequately representing the outcome of the discussions.

## 5. REPORT OF FIELD DAY

Field inspections are an important aspect of the activities of RWG 7. Accordingly, the second day of the meeting was given to this area. Members of Associated Forest Holdings Pty. Ltd. and the Forestry Commission attended. The Group is extremely grateful for their input and efficient organisation of the tour.

Included was the general plant practices of AFH Ridgley Eucalypt Nursery. The AFH research on eucalypt pests, particularly leaf beetles and defoliating caterpillars was outlined. Their coppice trials were keenly inspected. Among the pathological problems observed on the tour were Myrtle dieback, high altitude dieback, eucalypt cankers, radiata yellows, and eucalypt dieback associated with leafspot fungi. The choice of the Burnie venue enables access to all these interesting problems and practices within the one intense field day, which members agreed was highly beneficial to the understanding of the practical forest pathology problems in Tasmania.

## 6. THE COMPLETE TOPIC REPORTS

### 6.1 FOREST DISEASE LEAFLETS (Dr Old)

The decision to produce a series of leaflets on Diseases of Australian

Forest Trees had been made at Gympie in 1980 and Mr. Dare Edwards had accepted the responsibility for initiating and editing the series. DORC had approved the project and set aside \$4,000 as a contribution to their publication. Mr. Edwards retired before any action was taken and his successor Mr. J. Simpson was invited by the Chairman of RWG 7 to assume the responsibility with the cooperation of Dr. K. Old, CSIRO DFR. This arrangement was finalised in early 1983.

The aim of the leaflets is to provide an up to date body of information regarding the more significant, and better studied diseases of Australian forest trees.

At this meeting, these aims were confirmed, and the series is to be regarded as a specialist series of high scientific merit, rather than an extension service. The authorship should not be exclusively Australian; overseas contributors should be sought where appropriate.

Mr. Simpson gave an account of the progress made so far. The first four leaflets were to be on *Dothistroma* blight of pines, poplar rusts, *Armillaria* root rots and *P. cinnamomi* disease of eucalypts and exotic softwoods. A list of further topics was given. Prospective authors for the first four titles had been contacted and responses had been positive. The advisability of including standardised distribution maps based on records and specimens placed in Herbaria was discussed. This presented problems which were discussed, the decision being left to the editors. Other issues of importance were format, length, production of composite leaflets of standard length covering one, or several diseases, and choice of publisher were discussed.

The selection of CSIRO CILES services was strongly urged by Dr. Old as this group had experience in this type of project (e.g. Australian Forest Trees), and the infrastructure existed to handle publishing, advertising and sales and distribution.

With regard to the time frame for publication, it was envisaged that 4 to 6 leaflets should be produced during the next two years.

#### Summary

The series of leaflets "Diseases of Australian Forest Trees" is now a major project of RWG 7. Authors for the first four leaflets, namely, *Dothistroma* blight of pines, poplar rusts, *Armillaria* root and butt rots, and *Phytophthora cinnamomi* disease of forest trees have been invited. It seems likely that publication will be undertaken by CSIRO, CILES.

#### 6.2 PATHOLOGY OF FUNGI INHABITING EUCALYPT CANKERS (Dr Old)

Over the last three years an increasing amount of attention has been paid to fungi commonly isolated from twig, branch and trunk cankers and from stem lesions exuding kino of eucalypts in Western Australia and south eastern Australia. Species of interest include *Cytospora eucalypticola*, *Botryosphaeria ribis*, *Discosporium eucalypti* and an *Endothia* sp. so far called *E. havanensis*. The identity of the latter fungus has been called into question by the finding of sexual fruiting structures in NSW. Another fungus, tentatively identified as *Cryphonectria cubensis* (a serious cause of canker of eucalypts overseas) has been isolated from jarrah roots.

Pathogenicity tests in WA indicate that *B. ribis* and *Endothia* sp are more aggressive than *C. eucalypticola* and *D. eucalypti*: when inoculated into jarrah coppice. Stem inoculations of *E. delegatensis* and *E. maculata* in south eastern Australia have shown that *Endothia* sp. and *C. eucalypticola* may exacerbate Kino vein defect in the vicinity of wounds. Plantation eucalypts grown in locations significantly different from their native habitat with regard to site characteristics and climate may be particularly susceptible to damage.

#### Summary

A number of fungi can be regularly isolated from twig, branch and trunk cankers and stem lesions exuding Kino of native forest plantation eucalypts. Pathogenicity testing with *Endothia* sp, *Cytospora eucalypticola*, *Discosporium eucalypti* and *Botryosphaeria ribis* has resulted in a variety of symptoms including shoot death, bark cankers and extensive kino vein production. Further taxonomical work on *Endothia* spp is continuing.

#### 6.3 ROOT AND BUTT ROTS (Dr Brown)

Other than *Armillaria* at various locations, the only important root and butt rots in Australia are those of hoop pine in Queensland caused by *Phellinus noxius* and *Poria vincta*.

Major emphasis has been placed on the possibility of biological control of these pathogens. Starting with a wide range of saprophytes from hoop pine stumps, laboratory studies have been used to reduce the list to a small number of fungi which might be used as biological control agents. Pilot

studies have indicated that mycelial inoculation of hoop pine stumps with both *Pycnoporus coccineus* and *Trametes versicolor* is successful and that both fungi appear to reduce stump infection by *P. vincta*. Recently further field studies have been initiated using these and other potential biological control fungi.

Dr. J. Thornton pointed out that *P. coccineus* and *T. versicolor* were common causes of degrade of timber in service. The meeting agreed that there was a need to consider the potential for such fungi to spread from inoculated stumps via root connections to living trees and thus lead to heart rots and subsequent decay of timber from these trees.

ROOT AND BUTT ROTS (continued, Dr Kile)

(a) Armillaria

Recent research by the CSIRO Division of Forest Research was summarised (see attached). The Division continues research on the taxonomy of *Armillaria* in Australia and a cooperative study with the Victorian Department of Conservation, Forests and Lands on control of *Armillaria* root rot is being monitored. Recent observations indicate *Armillaria* root rot is more serious in Western Australian forests than previously appreciated (particularly in Wandoo) and a postgraduate student is engaged in a study of fungi for possible biological control of *A. luteobubalina* in karri stumps. Limited damage in recent pine plantings in northern New South Wales was reported. However research on *Armillaria* appears sufficiently advanced to provide a basis for operational control in those forest areas where it is required.

*Armillaria* root rot (caused by *A.l.*) is a more serious silvicultural problem in dry sclerophyll forests in southern Australia than has been appreciated in the past and the current level of research activity is justified.

Armillaria Root Rot: - Supplementary Summary for RWG 7.

This project has continued at a reduced level since mid 1982 compared with the preceding 5 years.

Major results to that date include:-

(a) The identification/description of four *Armillaria* species in southern Australia - *A. luteobubalina*, *A. novae-zelandiae*, *A. fumosa* and *A. hinnulea*. Some of these morphological taxa can also be identified by the characteristics of their vegetative mycelia.

(b) Development of an appreciation of the relationship between distribution of species of forest types and the inherent pathogenicity of species. This information will serve as a basis for assessing or predicting the role of *Armillaria* species in particular disease situations.

(c) Using interfertility techniques and intraspecific antagonism a detailed study of the ecology of *A. luteobubalina* was undertaken which provided an insight into the mode of distribution and dynamics of the fungus in eucalypt forest.

Detailed information on (a) - (c) can be found in:-

- (1) Kile, G.A. and Watling, R. (1983) *Armillaria* species from south-eastern Australia. T.B.M.S. 81: 129-140.
- (2) Kile, G.A. (1983) Identification of genotypes and clonal development of *Armillaria luteobubalina* Watling & Kile in eucalypt forest. Aust. J. Bot. 31:657-671.

Recent findings include:-

- (a) That the four *Armillaria* species differentiated on morphological criteria are also biological species (i.e. reproductively isolated with intersterility between single spore isolates of different species versus bifactorial heterothallism within species).
- (b) *A. luteobubalina* has a transcontinental occurrence (all States and the A.C.T.) Material from W.A., N.S.W., and Victoria has shown to be interfertile and the fungus identified by basidiomes in the other states. The occurrence of *A. luteobubalina* in gardens, urban parks and tree plantings, horticultural plantings and eucalypt forest indicates this species is a major pathogen causing significant economic losses.
- (c) *A. novae-zelandiae* occurs in Tasmania, Victoria and N.S.W. and interfertility between a N.S.W. and Tasmania single spore isolates has been demonstrated.

#### 6.4 VIRUSES, MYCOPLASMAS (Dr Palzer)

Work on the crown symptoms of "regrowth dieback" suggests similarities

with other diseases which have been associated with viruses, Mycoplasma-like-organisms (MLO's) or Rickettsia-like-organisms (RLO's). It appears worthwhile to continue work to investigate the possible involvement of such organisms in "regrowth dieback" and perhaps extend it to consider viroids as well.

The foliage symptoms of Eucalypts in "unexplained" diseases should be carefully examined and if they are suggestive to viruses, MLOs etc. samples should be sent to appropriate workers for further studies. Even if a disease is "explained" the interaction of viruses should be entertained as a possibility.

#### 6.5 EUCALYPT-LEAF SPOTS (Dr Palzer)

There is a generally acceptable knowledge on the mycological aspects of Eucalypt leaf spot diseases in Australia.

Efforts should be made to detect new outbreaks in the earliest possible stages so that information on the nature of climatic and other factors leading to the outbreak can be identified. Studies of epidemiology should be encouraged when opportunity arises.

#### 6.6 PINE WILT NEMATODE (Dr Old)

The nematode, *Bursaphelenchus xylophilus* which causes wilt of *Pinus* spp in Japan and North America is regarded as a potential threat to softwood forestry in Australia.

Experience in North America where the nematode is widely distributed

suggests that the epidemic proportions of disease in Japan may be accounted for by the extreme susceptibility of native pine species, and the presence there of a highly efficient vector (*Monochamus alternatus*). In the USA vectors appear to be less efficient and damage is often limited to trees stressed by other factors.

Pathogenicity tests in Japan and the USA have shown that *P. radiata* is susceptible to infection. If the pathogen was introduced into Australia, its impact would depend on vector efficiency and factors such as tree genotype, silvicultural practices, and environment. The outcome of such interactions is very difficult to predict.

RWG 7 should maintain a high level of awareness of the status of the pathogen overseas. A group from the FRI New Zealand is to visit California this year to study *B. xylophilus* in native stands, and their findings should be of special interest. The major control programme implemented in Japan should provide a useful data base in the event of the pathogen being introduced into Australia.

#### 6.7 WILT DISEASES (Dr Kile)

A new and probably indigenous species of *Chalara* has been identified as a cause of mortality of *Nothofagus cunninghamii* (myrtle beech) in Tasmania and Victoria. This is the first report of a native vascular pathogen in Australian forests. While a native ambrosia beetle (*Platypus subgranonus*) has been associated with mortality its precise role in transmission of the fungus is unclear. *Platypus - Chalara* is responsible for scattered to patchy deaths of *N. cunninghamii* in undisturbed stands and contributes to the severe but localised mortality associated with roading or selective

logging of eucalypts in mixed forests. It is too early to make any definite assessment of the significance of *Platypus - Chalara* in the ecology and conservation of *N. cunninghamii* but it seems likely the disease would be a problem in any silvicultural manipulation of *N. cunninghamii* stands. Continued research is necessary to fully identify the fungus and its mode and rate of spread, assess its host range and assess the incidence and pattern of disease development in natural stands.

#### 6.8 RURAL DIEBACK (Dr Kile - mistletoes, Mr Simpson)

Information tabled and oral comments indicated that in most States rural tree decline was seen to be a consequence of poor land utilisation practices and a symptom of ecosystem degradation and the current knowledge of regeneration and tree protection methods could contribute significantly to reestablishing trees in the rural environment.

Members noted, however, that there is widespread public concern at the high incidence of mistletoes on eucalypt and other trees in many parts of Australia, and the effects these pathogens may have on tree growth, vigour and survival. It was considered that research on the control of mistletoes should be encouraged and that other existing research projects on various aspects of rural tree decline should enjoy continued support as they will contribute to an improved understanding of the problem.

#### 6.9 WOOD-DESTROYING FUNGI (Dr Thornton)

The following five areas were considered briefly:-

- (1) Knowing what we have in terms of species

The need for more information, both individual case histories and on the abundance and distribution, on species of wood destroying fungi in service was stressed. The tabular update by Johnson, Walters and Tighe (1983 as yet unpublished) was mentioned and the current survey work of WT & FRD (NSW) encouraged.

(2) Knowing what we have in terms of rot types

More data on the susceptibility of heartwood to soft rot, brown rot and white rot fungi is required. Gary Johnson and myself are recording the presence and severity of these rot types, and their association with termite attack, from the CSIRO natural durability test.

(3) What the end user wants in terms of durability

Essentially the specifying engineer requires data on the "variability of performance" and "the time to first failure" (in order to formulate an inspection schedule and remedial or replacement schedules). The continued use of distinct durability classes (with their arbitrary boundaries) goes no way towards this practical requirement. Gary Johnson, myself and a statistician are intending to provide this variability data on the 76 species of timber currently exposed for around 15 years at 5 sites around Australia. At this stage we are refusing to employ any mathematical formula for predicting the further lifespan of any timber whose replicates are still serviceable at the present time.

(4) What quick results we can get on durability

We currently have an "accelerated field simulator technique" which is yielding very quick comparative results under controlled environmental conditions. A complete termite mound is included in order to give more data on termite resistance of those timber species currently exposed in the field. This technique will be useful for comparative durability studies of original and plantation/regrowth trees of the same timber species.

(5) The heart rot-centre rot story

Gary Johnson is beginning a study to determine the incidence of existing heart rot in seasoning logs and determining whether these fungi survive preservative treatment in order to become established as centre rots in poles. Artificially - inoculated logs will also be preservative treated to determine fungal survival. The lack of availability of non-durables presently held by SECV means that there is a possibility that this work may be performed, at least in part, at the SECWA.

6.10 PINE NEEDLE CAST DISEASES

Reports on needle cast diseases were presented by Mr. Simpson, Dr. Marks, Dr. Brown and Dr. Podger.

A. *Dothistroma septospora* (Dorog.) Morelet is now causing significant damage to *Pinus radiata* plantations in southern Queensland, the northern, central and southern tablelands of N.S.W., and north eastern Victoria.

Mr. Simpson and Dr. Marks reported that the disease which had declined to very low levels during the drought years of 1981-82 had quickly built up to damaging levels in 1983 and was now causing 80 to 90% defoliation in some areas.

The recent discovery of *Dothistroma* on pines in the central tablelands of N.S.W. appears to have resulted from a recent massive movement of airborne spore inoculum from the northern tablelands. The finding of the disease on highly susceptible species such as *P. altenuata*, *P. ponderosa*, and *P. nigra* highlights the value of arboreta as trap sites for disease detection.

Fungicidal sprays are now used routinely on *P. radiata* plantations in N.S.W. and are likely to be used in Victoria this year. In N.S.W. the spray mixture has been altered in each of the past two years. In 1982 copper oxychloride was applied at rate of 4.2 kg in 20 l of water per hectare instead of 50 l as used previously.

In 1983 the spray mixture was 1.67 kg copper oxychloride in 5 l of 40% white oil per hectare applied with Micronaires producing droplets of 50-65  $\mu$ m diameter.

On the northern tablelands *Dothistroma* was detected causing significant defoliation of a Queensland ex Florida provenance of *P. taeda*. However, it is intended to field test other provenances of *P. taeda* from more northerly latitudes with greater cold tolerance.

In *P. radiata* provenance trials at Walcha it was found that seed from Tallaganda seed orchard had greater resistance than any of the provenances

from California that were tested.

B. There is still a lack of quantitative data on the effect of species of *Naemocyclus* and *Lophodermium* on growth of *Pinus* species.

Recent changes in the taxonomy of the Rytismataceae (including Phacidiaceae) were discussed. The needle cast fungi *Naemocyclus niveus* and *N. minor* have recently been transferred to the genus *Cyclaneusma* as *C. niveum* and *C. minus* respectively.

#### 6.11 PHYTOPHTHORA (Dr Podger)

*Phytophthora cinnamomi* (PC) remains the single most important pathogen in Australian forests. However, it is now clear that severe effects on forest health are very largely restricted to less productive forests on soil of relatively low fertility.

Most tall forests on fertile soils are not likely to experience significant damage from this pathogen. An apparent exception is PC associated death of rainforest in submountain Queensland; proof that the fungus is the principal causal factor in this problem has yet to be demonstrated.

The range of climatic conditions under which PC may cause problems has been considerably extended by recent research in Tasmania and the Northern Territory.

In Tasmanian perhumid west coast region PC has been shown to be pathogenic to most species of temperate rainforest. Normally its activity under

forest canopy is restricted by low soil temperatures, but where canopy is removed mortality can be observed on infertile peaty soils which dominate the region. The fungus may have considerable potential to interfere with post-fire regeneration.

At Nhulumbuoy in NT dieback of *Eucalyptus tetradonta* has occurred in association with a species of *Phytophthora* distributed to PC by Dr Weste. There is now some doubt as to the specific identity of the fungus to which both Dr B.N. Brown and Dr Yip are giving attention. If it is in fact PC the occurrence is of major biogeographical interest.

Considerable progress has been made on the question of biological variability within populations of PC as a result of the availability of isozyme techniques. Important progress affecting genetic selection for resistance can be expected in the near future to complement the very excellent genetic work on *P. radiata* reported from WA.

Throughout Australia, but particularly in WA, considerable advances have been made in our understanding of how PC kills its hosts and how this interaction is influenced by environment. PC is much more an invader of roots and a direct killer than has been recognised in the long held view of its action through feeder root decay and subsequent environmental stress. A WA submission by Drs Shearer and Tippett offered a scheme for developing research priorities. The way in which RWG 7 might make effective use of this proposal will need to be considered during the term of the incoming Chairman. (Secretarial Note: members attending meeting please refer to their copy of Document 8, Appendix 1; non-members refer to the same document included with this Report).

Dr Marks of Victoria reported that operation scale rehabilitation trials to restore PC-damaged lower land eucalypt forests to their natural composition were providing very early encouraging results.

Interesting reports of biological detail on fungal antagonism, stimulation, mycorrhizal relations, etc. were provided. None, however, appears to represent a major breakthrough in terms of field control.

#### 6.12 MYCORRHIZAE (Dr Malajczuk)

Considering the importance of mycorrhizae of forest trees in both forest health and nutrition active research in this area appears to be minimal. Key subject areas such as taxonomy, ecology and physiology of mycorrhizal fungi associated with both pine and eucalypts have been identified for investigation. Current information presented on mycorrhizal work in Western Australia indicate considerable gains in growth increment can be obtained for eucalypts inoculated with specific tree-fungus combination on out plant during early stages of growth. Techniques for inoculation of eucalypt seedlings in nurseries have also been indicated. In light of these data the Working Group recommends there is a need to actively encourage research on eucalypt mycorrhizae directed specifically at the development of practical techniques for inoculation of eucalypts in forest nurseries.

#### 6.13 NEMATODES IN VICTORIAN NURSERIES (Dr Marks)

*Pratylenchus penetrans* (Root lesion nematode) was identified for the first time as a root pathogen of radiata pine seedlings in a nursery at Rennick, Western Victoria.

The nematode causes chlorosis, stunting and, under severe conditions, kills seedlings. It could have been in south western Victorian forest and nurseries for several years. It is widespread and well known in agricultural crops along the southern and eastern seaboard of Australia.

The nematode is easily controlled with nematicides. Biological control with *Tagetes patula* is now being tested.

#### 6.14 TAXONOMY (Mr Walker)

The following matters were considered:-

##### (1) National collections of plant pathogens:

Standing Committee on Agriculture has endorsed the concept of National Collections of Plant Pathogens and expressed its support for taxonomic work on plant parasitic micro-organisms in Australia. It has named the herbaria and culture collections housed in the Departments of Agriculture at Rydalmere, N.S.W. and Burnley, Vic. and the Department of Primary Industries at Indooroopilly, Qld. as the National Collection of Plant Pathogenic Fungi (with the major component at Rydalmere); the National Collection of Plant Pathogenic Bacteria at Rydalmere and the National Collection of Plant Pathogenic Nematodes at Burnley. These collections contain specimens and cultures from all plant groups and provide identifications for specimens for both agricultural and forest pathologists. The meeting agreed that Standing Committee on Forestry be informed of the importance of these collections for Australian forestry, and of the part they play in providing identifications of the pathogens

for forestry workers and that S.C.F. be requested to express their support for National Collections and contact Standing Committee on Agriculture about them.

(2) Commonwealth Mycological Institute

The significant contributions made by C.M.I. to world agriculture and forestry were mentioned and strong support for their contribution to forest pathology was expressed.

(3) Keeping of specimens of tree diseases

Permanent reference specimens of tree diseases, and living cultures of tree pathogens, need to be retained as evidence of what tree diseases occur in Australia, the host plants involved and the geographic distribution of the diseases. Forestry workers are strongly urged to lodge all such specimens in major Australian collections and also to lodge duplicates in Australian collections of any specimens or cultures sent to overseas experts for identification or comment.

(4) The Herbarium and Culture collections of the CSIRO Division of Chemical and Wood Technology.

This is the only collection in Australia specializing in wood decay fungi and it is of importance to all work on timber and wood decay in this country. It is an essential working tool for the people doing this work and material support to help with its preservation and upgrading is urgently required.

(5) Fusarium

The decisions of the Fifth International Fusarium Workshop held at the University of Sydney from 8-12 August 1983 under the auspices of the International Society of Plant Pathology were outlined. These propose an international working group to help solve current confusion in the naming and identification of species in this important genus.

Summary

The importance of taxonomy in identifying tree pathogens was stressed and the need for comprehensive herbarium specimens and living culture collections in such work was pointed out. The recent endorsement by S.C.A. of National Collections of Plant Pathogenic Organisms has supported much work in Agriculture and the participation of S.C.F. in supporting this work and the development of National Collections is sought.

6.15 FOREST PATHOLOGY - EDUCATION (Dr Parberry)

The new curriculum for B. For. Sci. at Melbourne University will, from 1985 on, include 20 hours of lectures and 45 hours of practical work for all students in 3rd year. This course gives a general appreciation of the importance of diseases in Forestry and familiarises students with the main groups of pathogens and diseases. Students may also elect a 4th year and take a 52 lecture and 75 hour practical course in Plant Pathology from which they should emerge able to practice as plant pathologists.

In addition, as a result of the development of a Wood Science course, it is seen as appropriate that it should include a segment on

biodeterioration.

Only one staff member is available to teach Plant Pathology to both B Agr. Sci. and B. For Sci. course. This staff member will have a lecture load in excess of 100 hours of lectures, plus 150 hours practical classes per year, as well as being responsible for the supervision of post graduates.

Future difficulties are seen in this single staff member being able to cope with an extreme work load of:- Over 100 lectures plus 150 hours practical work per year, responsibility for the supervision of post graduate students, administration responsibilities and the conduct of his personal research programme.

While some help can be sought from other Departments within the University, as well as La Trobe University, CSIRO and the Ministry of Conservation, Forests and Lands there is still a serious need for additional assistance. The appointment of a Forest Pathology Lecturer in the School of Agriculture and Forestry at the Univeristy of Melbourne is desirable.

#### 6.16 CONIFER RUSTS (Dr Old)

Conifer rusts have not so far shown a readiness for spread between the northern and southern hemisphere, and maintenance of rigorous quarantine should keep the risk of introduction at a low level. However the potential for severe damage to the crop makes this group of pathogens of particular concern.

The opportunity occurred in California for the examination of all 5 native

provenances of the species plus Australian and New Zealand selected families and hybrids. Data on the occurrence of between and within provenance variation in resistance under Californian conditions will be available by next year.

Concern was expressed regarding the possibility of heteroecious rusts, e.g. Fusiform rust, which could be of significance as autoecism may exist undetected in such species. It was also pointed out that many conifer rusts have alternate hosts in widely diverse families. Relaxation of quarantine regulations for these families could have unforeseen consequences for forestry. Detailed lists of tree rusts and their hosts would be a valuable aid to the quarantine service and these are to be prepared by RWG 7 members.

#### Summary

Conifer rusts are regarded as potentially important pathogens which could have severe impact on the softwood industry if introduced into Australia. Research is proceeding in California which seeks to evaluate variation in resistance to western gall rust in the native provenances of *P. radiata*. Concern was also expressed regarding other conifer rusts, e.g. Fusiform rust, and the possible introduction of heteroecious pine rusts with their alternate hosts. Detailed lists of tree rusts and their hosts are to be prepared by members of RWG7.

#### 6.17 RUSTS OF BROADLEAF TREES (Mr Walker)

These were discussed under four headings:-

1. Rusts of Myrtaceae

The rusts of Myrtaceae present in Central and South America were discussed. Of these, the guava rust (*Puccinia psidii*) is known to attack several species of *Eucalyptus*, and some species of *Callistemon*, *Melaleuca* and other genera. The existence of other rusts, different from *P. psidii*, which also pose a potential threat to Australian Myrtaceae was pointed out. The possible existence of Asian rusts of Myrtaceae was mentioned. Strictest quarantine measures to exclude these rusts are needed.

2. Rusts of Acacia

Many *Acacia* rusts in the genus *Ravenelia* occur in North, Central and South America, Africa and Asia. Rusts in other genera also occur in various other countries. The reaction of Australian *Acacia* spp. to these rusts is not known and quarantine measures to exclude them should be taken.

3. Broad leaf tree rusts in Australia with conifer hosts

These species were listed with their broad leaf and conifer hosts.

4. Broad leaf tree rusts not in Australia

Brief mention was made of many rusts on trees in several botanical families containing both introduced and native tree species. These rusts occur in many overseas countries. The preparation of an extensive list of such rusts, their hosts and geographic distribution and potential hosts in Australia which may be damaged if they are introduced was suggested and agreed to by RWG 7 members.

Summary

Many tree rusts occurring in other countries are potentially dangerous for many tree species, both native and introduced, in Australia. Of these, the guava rust, *Puccinia psidii* of Central and South Africa, can attack several species of Eucalyptus and other Myrtaceae. A comprehensive list of such rusts and their hosts is to be prepared by RWG 7 members.

6.18 QUARANTINE (Mr Simpson)

A number of situations indicating serious deficiencies in current quarantine practices were discussed. Amongst the issues raised were

(1) Import of *Eucalyptus* seed from India, Brazil and South Africa.

In 1983 it was learned that *Eucalyptus* seed was being imported from overseas. If a batch of seed weighs more than 5 kg it is fumigated with methyl bromide before release, and records are kept of the importer. However, if the seed batch is 5 kg or less the seed is subject to a visual inspection and if free from 'trash', released to the importer. In this instance no records of source or importer are kept, and there is no restriction on subsequent distribution of the seed within Australia. This is an unacceptable hazard to the forests of Australia as many exotic diseases of euclaypts could be seed borne.

(2) Pine bark imports.

Substantial quantities of pine bark are being imported in container loads

from New Zealand and the west coast of North America. The bark is accompanied by documents stating it has been fumigated or sterilized before export. Inspections by Quarantine officers are said to be infrequent. We believe the import of pine bark from overseas poses an unacceptable disease and insect risk.

(3) Cultures of edible wood decay fungi.

The taxonomy of species of *Pleurotus*, *Lentinus*, *Panus*, and other species of *Polyporaceae* (sensu Singer) in Australia is poorly known. The import and release of cultures of exotic species of those genera which produce edible fruit bodies may pose a decay and disease hazard to forest trees. For example in North America *Pleurotus* can be a significant decay pathogen in *Populus* species.

(4) Refugee boats.

Some refugee boats beached on the north coast of Australia contained wood-inhabiting fungi and insects, straw and agricultural produce. Many of the boats were abandoned and never removed, disinfected or destroyed. This poses a significant quarantine risk to both forestry and agriculture.

(5) Import of wood

Imports of wood which has not been either kiln dried or fumigated pose a potential forest insect and forest disease or decay problem. Root rot fungi such as *Fomes annosus*, *Phellinus weirii*, *Echinodontium*, could be introduced this way.

(6) Peat (Dr Podger)

Imports of peat for the horticultural trade originate from half-a-dozen foreign countries. Estimates of variable reliability place this trade at some 7000 to 20,000 tonnes per annum. Little, if any, of this appears to have been sterilized. Despite claims by some authorities that peat is too acid to support pathogens, it is known that naturally occurring infection by *Phytophthora cinnamomi* has been sustained in *Sphagnum*-dominated peat communities in the Tasmanian highlands. The main sources of New Zealand peat in Waikato and Southland are in areas receiving run off or wind-borne flora from plantations of *P. radiata* or other trees of commercial importance to Australia.

7. ELECTION OF OFFICEBEARERS

The incoming officebearer is:-

MR J.A. SIMPSON AS CHAIRMAN

(DR J.D. THORNTON continues as Secretary)

8. APPENDIX 1

List of Documents Presented to Sixth Meeting of the Forest Pathology  
Research Working Group.

1. Notes on Queensland Diseases - L. Bolland and B. Brown.
2. Position Statements, CSIRO DFR Forest Disease Programme - K. Old,  
D. Murray, M. Dudzinsky, G. Kile and F. Podger.
3. *Armillaria* Root Rot - G. Kile.
4. Eucalypt dieback on the Northern Tablelands of New South Wales -  
C. Nodolny, J. Williams and J. Brown.
5. *Botryosphaeria ribis* infection assection with death of *Eucalyptus*  
*radiata* in an Arboretum - B. Shearer.
6. Eucalypt cankers in the South West of Western Australia - E. Davison.
7. *Phytophthora* at Nhulunbuy, Northern Territory - B. Brown.
9. Quarantine for Forestry Species - S. Navaratnam.
10. Draft: Plant Quarantine Leaflet, *Eucalyptus* Rust, *Puccinia psidii*  
Winter - S. Navaratnam.
11. Associated Forest Holdings Proprietary Limited, Field Day Notes -  
D. de Little.

12. Proposed Workshop to be Held at Next Meeting RWG 8, Perth, WA -

R. Paton.

13. Letter: Editorship of Disease Leaflet Series of RWG 7 - F. Podger to

J. Simpson.

14. Letter: Workshop on Contingency Planning for Forest Pests and

Diseases - I. Bevege to J. Landsberg.