Comments by 5th May Mr Reed

DRAFT

JARRAH DIE BACK

Introduction

1. The disease commonly known as jarrah die-back is caused by the root-rotting fungus Phytophthora cinnamomi. The fungus is not indigenous to Western Australia, which means that only those areas of forest to which it has been transported are at present affected.

Dieback caused by Phytophthora cinnamomi

It attacks and destroys the fine feeding roots of both jarrah and a wide range of understorey and ground vegetation species, depriving them of access to moisture and nutrients.

Root damage

2. The development of the fungus occurs mainly in the top 45 centimetres of soil and is favoured by warm and moist conditions, and especially by periods of temporary waterlogging.

Conditions for fungus development.

3. Dispersal is mainly by transportation of mud or soil containing infected root material and fungal fragments. The main agents for dispersal are vehicles carrying mud and surface run-off. The fungus also moves as water-borne zoospores which are themselves capable of locomotion over very small distances. Hence the general tendency towards rapid spread down-hill. The rate of uphill spread is slow, amounting to about a metre per year.

Methods of dispersal

Resistant spores are also produced but their precise function as dispersal agents is not known.

4. The spread of the fungus in the forest occurs through

Means of spread

(a) the natural extension of already affected areas; and

(b) the establishment and subsequent development

5. The Physical control is likely to be extremely expensive, but any measures which make conditions on already infected areas less favourable for the development of the fungus, or which curtail the possibility of establishing new centres of infection will slow down the overall rate of spread through the forest. This is currently estimated to be at about 4 per cent of affected areas per year. Controlling spread

These measures come under the general heading of Forest Hygiene. They are outlined below and they will be applied to both Departmental and trade operations.

6. Major factors on the nature of the disease are :

(1) Though the pathogen is probably present in karri, wandoo and tuart forests, its impact in these is not significant.

(2) In the jarrah forest there is evidence of differential susceptibility to the disease on various landforms and the terminal impact varies from minor to severe. Mapping is required to define the location of each dieback susceptibility class and to identify protectable areas.

(3) In Western Australia there is little doubt that spread of the disease is dependent on both artificial and environmental factors.

(4) Initial infection is most commonly caused by transportation of infected soil on vehicles and heavy machinery. Natural spread of the disease is initially fairly rapid downhill from a new infection but then becomes quite slow, as the means of spread is by movement of water borne swimming spores.

(5) There is a time-lag between infection and the appearance of visible symptoms, and areas which have been exposed to infection, yet appear to be disease free, need to be quarantined for a period that allows visible expression of the symptoms.

(6) Conditions favouring the activity of Phytophthora are moist soils with temperatures in excess of 15°C. Whilst these conditions are necessary for active growth of the fungus, it can persist in the soil for long period irrespective of summer drought or winter cold. During summer, dry soil is less likely to be picked up by a vehicle. There is evidence that the fungus seldom survives in small quantities of soil that are dropped in positions where they will be subject to high summer temperatures and rapid desiccation.

(7) The disease occurs world-wide and has been the subject of intensive research for some years, but there is no known way to eliminate it on an operational scale in the field. It is possible to kill the fungus in small samples of soil by steam or chemical sterilisation. The only appropriate field control measures are those aimed at minimising artificial spread.

(8) The disease attacks a wide range of plants, including shrubs, herbs and trees, causing deterioration of the root system, which may kill the plant. In the south-west of Western Australia the pathogen is favoured by the susceptibility of major genera, the generally old infertile soils and the marked seasonal rainfall. This rainfall pattern causes waterlogging of lowland areas in winter and spring, followed by high moisture stress in summer. As a result, whole plant communities can be destroyed.

(9) The most recent estimate indicates that an area of approximately 183,000 hectares of State Forest is affected by the disease - markedly higher than previous figures. Part of the increase is due to natural and artificial spread and part to improved mapping technique. A similar area of State Forest that is not protectable from infection is believed to exist. It consists of highly susceptible sites located downslope from known infections.

Departmental Objective Policy and Strategy on Jarrah Dieback

7. Objectives of Management for Dieback

To limit the spread of infection and to rehabilitate dieback infected areas to suit the future land use.

8. Departmental Dieback Policy

(1) Classify State forests according to disease presence, susceptibility of the site and disease resistance of the vegetation to the disease.

(2) Continue to use forest quarantine measures to detect and map the disease.

(3) Continue to improve and apply hygiene measures.

(4) Rehabilitate infected areas with resistant species to suit the anticipated land use.

(5) Continue to investiage methods of disease control and rehabilitation techniques.

9. Management Strategy

(1) Improve remote sensing techniques to prepare accurate maps for subsequent monitoring of diseased areas.

(2) Extend the value of forest quarantine giving priority to high value forests with low levels of infection.

(3) Continue to apply hygiene restraints into all permits, licences and contract operations which involve vehicular movement on State forests.

(4) Rehabilitate infected areas in the salt-sensitive zone to a full canopy of deep-rooted perennial species in accordance with predetermined management priorities.

(5) Extend practical trials of various operational hygiene techniques to test their effectiveness.

(6) Continue to disseminate information on dieback and its control to all forest users and to the general public.

(7) Liaise with other organisations to foster research on dieback and to avoid duplication of effort.

Risk Category Classification

Disease status of forest

10. Each forest area is to be classified on a plan according to its disease status. The risk category defined will form the basis for movement of vehicles and equipment throughout the forest.

Risk category classi-fication

11. The risk categories recognised are :

(1) Dieback infected forest

(2) Forest expected to succumb to the disease at some time in the future. This category is known as "non-protectable forest" and is that area lying below a dieback infected site. It is expected to succumb to the disease by natural downhill movement of the disease in the watertable.

(3) Forest considered to be protectable from the disease. This is forest which is considered free from infection and topographically situated above known infections. It is expected that with effective hygiene measures this forest can be maintained in a dieback free condition. These areas are known as "protectable"forest areas.

(4) Forest considered to be resistant to the disease. This "resistant" forest is either forest in which the major vegetation does not succumb to the disease or forest

consisting of susceptible species which are situated on fertile and well drained soils.

pdate of isk category plans

12. The Officer in Charge of each Division is responsible to maintain up to date information on new disease infections. This information is to be forwarded to the relevant Working Plans Officer.

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13. There is evidence that some dieback areas spread more slowly than others. Some non-protectable forest areas are therefore predisposed to earlier infection than others. Officers in Charge are to take this into account when setting works priorities.

Forest Hygiene

ygiene ationale

14. New infections are caused by transport of infected soil to new areas. The potential to do this by movement of vehicles and equipment through infected and uninfected forest is high. In order to limit the potential to further spread the disease, it is necessary that vehicles moving into uninfected areas be cleaned of soil and mud and hence not able to cause further dieback spread.

orest uarantine

15. Hygiene is best practiced where the location of all dieback infections are accurately known. Because there is a time lag between infection and detection of the disease by its visible symptoms, it is necessary to exclude vehicular movement in the area for a period of time (quarantine) and then accurately map all infections. This practice of quarantining portions of the forest is being carried out in many areas.

Prescriptions

16. Dieback hygiene measures are to be prescribed for all activities on State Forest. These prescriptions must be on a risk category basis and cover such aspects as

a) season of operation
b) access to be used
c) briefing of personnel
d) cleanliness of vehicles
e) risk category demarcation
f) sequence of operation
g) whether area quarantined

emarcation of isk category oundaries

17. Field demarcation of risk category boundaries are to provide the basis for hygiene requirements for activities in the forest, e.g.

a) harvesting silvicultural, fire control and other forest maintenance work
b) construction and maintenance of public utilities
c) construction and maintenance of access for all land uses
d) provision and maintenance of recreation facilities.

18. Wherever possible the use of vehicles and equipment which minimise the risk of disease spread are to be prescribed (e.g. rubber tyred tractors). As a principle use of crawler tractors are to be confined to

Logging Priorities

Sequence of logging operations

19. Logging will only be permitted within quarantined areas where consent of the Conservator has been obtained prior to proclaimation.

Outside quarantined areas the priority for cutting will generally be as follows :

a) Areas which are subject to approved clearing

operations (e.g. for public utilities, mining, plantation establishment, research projects etc).

b) dieback infected forest

c) non protectable forest

d) protectable and resistant forest. The priority allocated between these two risk categories to take account of erosion control and ecological factors.

Perimeter Buffer area

20. Where logging takes place at the interface between protectable and dieback infected forest a perimeter buffer belt of 40 metres within the apparently uninfected forest is to be retained from cutting. This is to avoid the potential to contaminate the protectable forest by lateral movement across the boundary between infected and uninfected areas.

Cutting intensities

21. Subject to land use management constraints and the silvicultural system adopted, utilization is to be maximised on each cutting coupe to minimise the area subjected to vehicular activity.

Summer cutting in resistant protected forest

22. Wherever possible, logging in protectable and resistant forest types is to be carried out during the dry summer period only. This principle may be relaxed where

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ckpiling

23. Summer stockpiling by mills is to be encouraged wherever possible so as to reduce the general level of activity during winter. This is the worst time for spreading infection by mud carried on equipment and by surface run-off.

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scriptions

24. These prescriptions will apply to the general run of trade operations. Specific instances, such as mining timber operations at Collie, required speciesl prescriptions to be approved by the Regional Operations Leader. A specific recommendation should be forwarded to the Superintendent where it is evident from the three year logging plans that mill capacity in a particular locality is insufficient to cope with dieback arrears and extensions within that period. This also applies to unallocated as well as to permit and licence areas.

Integration of Operations

trade
rations to be
egrated

25. To be fully effective, hygiene measures must be applied to all operations in the forest. Pole and pile, salvage, firewood and other minor operations will follow the sequence of priorities set out in Para. 18. and will be concentrated upon areas scheduled for trade cutting.

uence of
oval of
est products

26. Where a number of wood products are to be removed from an area the order in which removal is to take place is to be :

a) poles, piles and veneer logs

b) sawlogs

c) fencing and other round timber supplies

d) wood residues

The removal of these products must be designed in such a way that the same access routes are used but programmed to avoid simultaneous use of these haulage routes.

parate Minor erations

27. Where it is necessary to mount separate minor operations, strict hygiene must be observed. Cutting must be completed in all affected areas before proceeding to unaffected country; lateral movement across the boundary between patches of affected country must not be permitted; and cutting in elevated positions, especially across ridge tops, must not be permitted without specific approval from the D.F.O.

Designation of Access Routes.

28. The D.F.O. will designate specific access routes to each coupe, including those for independent pole operations, so that unaffected areas will only be logged along clean access routes and the chances of new infections as a result of hauling from affected coupes will be minimised.

The chances of picking up infection from the surface of well-drained, gravel-sheeted logging roads running through infected country are considered to be relatively slight. The main problem arises when inoculum is picked up from infected boggy gullies and transported onto unaffected ridges further along the same road. This can be avoided by restricting theuse of such roads in winter and by proper attention to creek crossings, which will be required even for summer operations.

naffected areas be logged via lean access routes

29. Access must receive special consideration when preparing three year logging plans, and the routes selected to serve each coupe must be clearly indicated in Forms 49B. The reasons for selecting particular routes should be discussed in advance with mill management, as also should the general order of logging priorities. Regional Operations Leaders will

be required to check the selection of access so that existing tracks are used to best advantage from a dieback hygiene point of view.

30. D.F.O's are to ensure that the surfaces of sawmill landings are hand surfaced and well drained to minimise the potential of these areas to become a source of infection.

New Road Construction

31. Construction of new roads by both the industry and the Department will be kept to the essential minimum.

New alignments

32. New alignments and realignments of existing roads should be pegged and approved for hygiene by a competent officer before construction starts, especially where the boundaries of dieback are uncertain.

Drainage

Lower, but well drained, slopes following the main gully systems are the preferred locations for new roads; good surface drainage with proper turn-offs linking up with natural drainage channels are to be provided.

Gravel and borrow pits

33. Sites for borrow bits must be approved by a competent officer before the start of any excavation; infected gravel must not be used on roads traversing unaffected country; and gravel for roads traversing affected areas should be obtained preferably from isolated patches of unaffected country, from which the spread of further infection will only be very limited.

34. Inspectors will examine and approve divisional roading programmes before estimates each year, and in this connection basic units of 1000 hectares in jarrah and 200 hectares in karri will be adopted to minimise new road construction when subdividing cut-over maiden forest.

Silvicultural Systems

35. The concept of heavy cutting to reduce the total area rendered liable to infection each year has many additional advantages in connection with operational control and protection of regrowth.

Subject to proper local prescription by the D.F.C. the cutting systems will be -

1. Full utilization (dieback infected non-protectable areas).

Greenline cutting

a) Indicating the outer edge of dieback activity, will be marked on the ground by paint marks on the edge trees which will be retained, or by toe marking a perimeter strip. Where the Green Line is difficult to detect, an arbitrary boundary may be marked in the same way up to two chains beyond the edge of obviously seriously affected country.

Clean cutting will then proceed inwards from the Green Line, and all logs will be hauled out through the affected area.

Narrow affected gullies and isolated affected patches of less than 2 hectares will be ignored at this stage.

Rounding off coupes for green line cutting by the inclusion of substantial areas of unaffected country (5 hectares or more) must be approved by the Regional Operations Leader in each instance.

b) Clean cutting in non protectable forest

Non protectable forest will be demarcated by paint marks on edge trees which will be retained similar to the "greenline" for dieback infected areas. Clean cutting will take place inwards from the boundary and all logs hauled out through the non-protectable area.

Areas of non-protectable forest of less than 5 hectares are to be cut in conjunction with adjacent dieback cutting.

2. Uniform System (Protectable and Resistant Forest Types)

Cutting prescription in unaffected areas

These ares will be treemarked under a uniform system retaining only genuine crop trees below 90 in. g.b.h. in A+, A, and B+ height class forest. In poorer forest types the limit is 72 in. g.b.h. These trees will be retained to provide a potential for jarrah regeneration.

The Inspector must approve all cutting in un-affected areas and priority will be given to concentric cutting with haulage preferably along the contour around affected areas which have already been cut over.

Cutting in unaffected areas should stop two chains short of the edge of active die back, and all logs must be hauled back through the unaffected area.

Vehicle Cleaning

36. Proper planning and designation of access may largely eliminate the need for daily washing down of vehicles. But it is essential that all vehicles and heavy equipment should be free of any soil or mud before entering clean country. This applies particularly to material carried on crawler tracks, on the suspensions of and between the dual tyres of vehicles, and on the trays of trucks and low-loaders.

Contractors' vehicles

37. Contractors to the Department and to the industry, or their operators, will be required to see that their machinery is in a clean condition, and a hygiene clearance should be given by a competent officer before the equipment starts work in unaffected areas.

38. The transfer of contractor equipment from one Division to another will present serious problems, for which a system of vehicle identification is being considered as a possible solution.

It is hoped that an adequate standard of hygeine will be obtained and maintained through the co-operation and sense of responsibility of the industry, rather than through legislation. Every opportunity should be taken to demonstrate the need for hygiene, but serious and consistent offenders should be reported through the normal channels.

Method of cleaning

39. Vehicles should be cleaned by compressed air blowers or by dusting with a hardbrush or broom whenever possible. Washing down with water will often be the most practical but care must be exercised to ensure the vehicle does not collect contaminated mud from the washdown site. To this end the vehicle must be placed on a hard well drained surface and the water treated with copper sulphate at the rate of 2 parts per million (1 teaspoon full per 1000 litres of water).

Vehicle Cleaning Sites.

40. Where operations require ongoing vehicle cleaning, authorised cleaning areas (or washdown stations) are to be established. These sites are to be placed at the boundary of infected and uninfected areas and used when vehicles enter the uninfected area. Vehicle cleaning sites must be hard surfaced and well drained. Drainage must not be into uninfected forest.

Wahsdown ations

41. Each Divisional Office is to have an area designed and developed for washing down of plant and equipment.

Departmental Activities

42. Strict standards of vehicle hygiene and movement control must be maintained in all Departmental operations, so as to set an example to all other forest users and to reinforce the importance of the hygiene programme in the eyes of the industry and of general contractors.

43. The following guidelines will be adopted under the general surveillance of the Inspector -

orks programmes nd access routes

(1) Divisional works programmes will be planned to avoid cross-travel between risk category boundaries and to reduce the need to work in protectable and resistant areas in winter.

ehicle leaning

(2) Vehicles and equipment should use designated access routes, and should be thoroughly cleaned down before being transferred to clean areas. A thorough hosing down with a high-pressure hose is considered an adequate cleaning. But a proper outlet must be provided for the effluent to avoid contamination of adjacent forest.

ccess routes arked on risk ategory plans

(3) Designated access routes serving both clean and affected areas within the die-back zones should be clearly indicated on the risk category plan (Para 10). This map should be prominently displayed and the D.F.O. should explain clearly to all staff and employees the reasons why designated access must be used

Road grading

(4) Road grading should be confined to major access routes, and to those tracks considered essential for the annual prescribed burning programme.

Other road maintenance

(5) Other road maintenance should also be restricted to those routes which are considered essential for basic access. Particular attention should be paid to the provision of proper turn-offs linking to natural drainage lines for surface run-off from major roads and tracks.

Road pegging

(6) The junction between infected and uninfected forest on road alignments is to be demarcated by painted pegs.

The side visible when entering dieback is to be painted yellow and the side visible when leaving dieback infected areas is to be painted green. Pegs are to be located 10 metres uphill from the visible symptoms.

Machines used for road maintenance or construction are not to pass from clean to infected areas without being cleaned down.

Where creeks or flats do not exhibit visible symptoms of dieback they are to be assumed to be infected and pegged accordingly.

Lesser tracks will be kept free from logs, but will only be graded when in danger of becoming obliterated or when needed for prescribed burning.

Road relocation

(7) Relocation of existing roads should only be considered under exceptional circumstances and each project should receive specific approval from the Superintendent.

oad closure

(8) Roads constructed from the Forestry Fund may be closed on the direction of the Conservator and subject to the display of appropriate notices. This should apply to ridge-top roads built for aerial burning in the southern forests subject to a specific recommendation in each case.

urning and
reen line cutting

(9) It is necessary to avoid prescribed burning in dieback areas scheduled for Green Line cutting whereeve possible because this operation obliterates many of the indications of the extent of dieback.

(10) The timber industry has co-operated extremely well with respect to dieback hygiene. However, it is vital that all other bodies or concerns using or operating in State Forest adopt similar standards of hygiene. This includes the Telecom , SEC, MPD, Local Authorities, Westrail, mining companies etc. Regional Operations Leaders and D.F.C.'s are responsible for seeing that hygiene is properly implemented by all forest users. They must give prior advice of any projects or activities proposed in areas under control and take every opportunity to instruct supervisors and operatives in hygiene requirements before and during the operation. They must also supervise and see that their staff are compet ent to supervise the hygiene aspects of such projects while in progress.

Forest Quarantine

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uarantine

44. In order that hygiene practices are effective it is necessary for the location of all infections to be accurately mapped. To do this, vehicular traffic has been excluded from many forest areas to allow those infections present to visibly manifest themselves.

Legislation

45. The Forests Act Amendment Act, 1974, gives the authority to designate forest disease risk areas and forest disease areas and specify restrictions to access of potential disease carriers (vehicles) Forests disease risk areas may be proclaimed by the Governor upon advice from the Minister and similarly may be abolished by proclaimation.

Briefing of forest users

46. Prior to implementation of quarantine it is essential to brief industry and other organisations using the specific forest area. They must be made aware of the rationale and requirements of implementation and where impining on approved operations alternative arrangements made to cater for their requirements.

Road Classification

47. Some access will be required with large sections of forest subject to quarantine for necessary works such as maintenance to public utilities, access to farmers, public roads, and access for essential research. Some roads will not be required during the period of quarantine. Roads are to be classified as follows.

a) Unrestricted Access - no restrictions to traffic flow. These roads are to be hard surfaced and well drained.

b) Restricted Access - use by specified vehicles for specific and approved reasons only. Permit for entry required. These roads will be placed in a hard surfaced and well drained condition.

c) Closed Roads - to be used only for specific approved work under specific conditions by permit only (e.g. prescribed burning operations)

Signposting and Road Closure

47. Upon proclaimation signposts as outlined in the appendix are to be erected along the boundaries of quarantined area and along unrestricted access at the junction with internal tracks and roads.

Physical closure of roads should be undertaken where patrols indicate penetration into the quarantine area disregarding signs.

Entry points

48. Persons proposing to enter roads within quarantine areas by vehicle are to apply for a permit to enter. This is to be granted for essential work only generally to persons with whom arrangements for such access have been made prior to proclaimation. (e.g. Apiarists, research works, public utilities etc). Permits are not to be issued to individuals or organisations for convenience reasons only.

Permit restrictions apply to Forests Department personnel and their compliance is required to be exemplary.

A copy of the Permit Document (FD) is appended.

Patrols

49. The effectiveness of quarantine must be continually monitored by patrol. Both aerial and ground patrols may be used. OIC's are to ensure time is provided for regular boundary patrols but where possible this is to be combined with normal duties.

Statistics

50. Statistics are to be provided to Protection section each month showing number of patrols, breaches, locations etc. (copy appended). Similarly up to date plan is to be maintained in each Divisional office showing this data.

reatment of ffenders

51. When offenders are apprehended the "friendly forester" appro ch is to be presented. Education is to be the objective. Breaches will be reported on Form F.D. 641 and offenders will be written a letter of warning and provided with information leaflets.

Prosecution will occur only when offences are repeated or where the offenders do not cooperate with the apprehending officer.

apping disease location

52. It is essential that forest operations (e.g. prescribed burning) do not impinge on photography requirements for locating and mapping infection. It is essential that close liaison is maintained betwe Planning and Operations staff on this matter.

Training

Uniformity of hygiene principles

53. In all aspects of hygeine it is essential that princip adopted remain uniform. Regional Operations Leaders, Protection and Extension staff are responsible to see that the principles adopted for internal operations and outside bodies do not conflict and therefore reflect on our integrity and management capability.

Training

54. On going training is to be programmed at all levels and with forest using organisations to ensure uniformity of approach, understanding, new tech iques etc. are properly disseminated.