

1. INTRODUCTION

Departmental reports and reports received from visiting scientists indicate that -

- 1.1 (Phytophthora) cinnamomi is the causal agent of the disorder commonly known as "Jarrah Die-back".
- 1.2 This soil borne fungus attacks and destroys the fine feeding roots of a wide range of hosts, gradually depriving them of an access to moisture and nutrients.
- 1.3 The development of the fungus is favoured by warm and moist soil conditions, and especially by periods of temporary water-logging.
- 1.4 The main means of dispersal, is by transportation of mud or soil containing already infected root material which may be distributed by surface run-off or by transport upon vehicles. The fungus can also be spread by water borne zoospores, which are themselves capable of locomotion over very small distances. Hence the general tendency towards rapid spread down down hill.
- 1.5 The fungus also produces resistant spores which can sustain fairly high levels of insolation and desiccation, but whose precise functions as agents of dispersal are as yet unknown. However, it is generally thought that the chances of establishing new infections as a result of these spores being distributed in summer dust clouds, are relatively slight.

2. SPREAD OF INFECTION

- 2.1 Spread of the fungus throughout the forest occurs through -
 - (a) The natural extension of already affected areas.
 - (b) The establishment, and subsequent development of new centres of infection.

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 possibilities 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% of affected areas per year.

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

3. ZONING OF DIEBACK TYPES

3.1 The forest will be divided into a number of zones, depending upon the degree of infection, so as to provide a basis for movement control and logging priorities. These zones will be -

- Zone A Unaffected; only to be logged under strict hygiene.
- Zone B.1 Slightly affected; logging to be restricted to affected portions only for the time being.
- Zone B.2 Severely affected; logging to^{be} concentrate in affected portions; unaffected portion may be logged under hygienic conditions before proceeding elsewhere.

3.2 D.F.O.'s will maintain a set of plans showing the zone boundaries throughout their Division. These plans will be updated as new information becomes available from any sources, such as ground inspection, aerial reconnaissance, or air-photo maps supplied by Working Plans.

D.F.O.'s will also be expected to search for and delineate on the plan any areas, of over 1,000 acres of prime Jarrah (90' or better) forest free from dieback, which can be set aside as "Intensive Management Units" to be worked under the strictest hygiene and intensive silvicultural treatment.

4. LOGGING PRIORITIES

4.1 Bearing in mind that each of the affected zones will contain substantial tracts of unaffected country, the general sequence of logging will be -

1. Affected areas Zone B.2
2. Affected areas Zone B.1
3. Unaffected areas in Zone B.2 and Zone B.1 (in that order), using strict hygiene and carefully selected access routes; wherever possible cutting will be in concentric belts surrounding already affected areas.

4. Zone A. - only to be logged when no other country is available, and then preferably by permits completely contained in this zone; logging will be under strict hygiene and along carefully selected access routes.

4.2 For the present, unaffected areas of 200 acres or more in Zones B.1 and B.2 will be reserved from cutting.

When these areas are eventually logged, a perimeter belt two chains wide within the unaffected country will be reserved from cutting, so as to reduce the possibilities of contamination by lateral movement across the boundary between the affected and the unaffected types.

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

5. INTEGRATION OF OPERATIONS

5.1 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 4, and will be concentrated upon areas scheduled for Trade Cutting. These operations, using the same access, may precede or follow major logging, but must be programmed to avoid simultaneous use of the same haulage routes.

5.2 Where it is necessary to mount separate minor operations, strict hygiene must be observed. Cutting must be completed in all affected areas of Zones B.2 and B.1 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.

6. DESIGNATION OF ACCESS ROUTES

6.1 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.

- 6.2 Access must receive special consideration when preparing Five-year Logging Plans, and the routes selected to serve each coupe must be clearly indicated on 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. Inspectors will be required to check the selection of access so that existing tracks are used to best advantage with minimum inconvenience to the industry.

7. NEW ROAD CONSTRUCTION

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

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 die-back are uncertain.

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.

- 7.2 Sites for borrow pits 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.

- 7.3 Inspectors will examine and approve divisional roading programmes before estimates each year, and in this connection basic units of 1,000 acres in the Jarrah, and 400 acres in the Karri, will be adopted to minimise new road construction when subdividing cut-over maiden forest.

8. SILVICULTURAL SYSTEMS

8.1 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.

8.2 Subject to proper local prescription by the D.F.O., the future systems will be -

1. Green Line Cutting (Affected Types Zones B.1 and B.2)

The "Green Line" indicating the outer edge of die-back activity, will be marked on the ground by paint marks on the edge trees which will be retained. 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 gulleys and isolated affected patches of less than 10 acres will be ignored at this stage.

Rounding off coupes for green line cutting, by the inclusion of substantial areas of unaffected country (20 acres or more) must be approved by the Inspector in each instance.

2. Uniform System (Unaffected Types in all Zones)

These areas will be treemarked under a uniform system retaining only genuine crop trees below 90" g.b.h. These trees will be retained to provide a potential for Jarrah regeneration.

The Inspector must approve all cutting in unaffected 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.

9. VEHICLE CLEANING

- 9.1 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.
- 9.2 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.
- 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.
- 9.3 It is hoped that an adequate standard of hygiene 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.

10. DEPARTMENTAL ACTIVITIES - GENERAL OPERATIONS

- 10.1 Strict standards of vehicle hygiene and movement control must be maintained in all Departmental operations, as a means of reinforcing the importance of the hygiene programme in the eyes of the industry and of general contractors.
- 10.2 The following guide lines will be adopted under the general surveillance of the Inspector.
1. Divisional works programmes will be planned to avoid cross travel between the die-back zones, and to reduce the need to work in die-back areas in winter.
 2. Vehicles and equipment, obliged to work in die-back areas, should use designated access routes, and should be thoroughly cleaned down before being transferred to clean areas.

3. Designated access routes serving both clean and affected areas within the die-back zones should be clearly indicated on the Zone Map (Para 3). 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.
4. Road grading should be confined to major access routes, and to those tracks considered essential for the annual control burning programme. Continuous grading through boggy creek crossings should not be permitted; these crossings on the minimum number of essential access tracks should be filled to provide dry traffic conditions.
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.

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

6. Relocation of existing roads should only be considered under exceptional circumstances and each project should receive specific approval from the Superintendent.
7. Roads constructed from the Reforestation 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.

An amendment to Forest Regulations will be needed, should it be found necessary to further restrict movement along former logging roads and other roads not constructed under Reforestation Fund.
8. It is desirable to avoid control burning in die-back areas scheduled for Green Line Cutting wherever possible because this operation obliterates many of the indications of the extent of die-back.

9. The rehabilitation programme, including plot establishment and retention of species will be the subject of separate instructions.

11. TRAINING AND EDUCATION

- 11.1 Success of the hygiene programme will depend on the knowledge and active interest of each individual working in the forest. Subject to approval from senior management in the industry a team of lecturers will be nominated to demonstrate the need for hygiene to local groups of mill staff and bush workers. Representatives from other organisations operating in forest areas, including Shire Councils, will also be invited to attend.
 - 11.2 Refresher courses will be held for Departmental staff and employees, following which the D.F.O. will be expected to organise and maintain the hygiene programme within the Division under the general surveillance of the Inspector.
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