Jarrah Root Rot

by Frank Batini

From the time that timber was exported from Western Australia in the early 1800s, it ranked among the leading primary industries of this State. Its widely decentralised nature has greatly assisted the development of the south-west.

Apart from timber values alone, the 4,500,000 acres of dedicated State forest assist the conservation of water, wildlife and wildflower resources and are an important recreational asset.

Jarrah (*Eucalyptus marginata*) is the most important timber species in this State, yielding a cut with an annual value of approximately $23,000,000. This forest is threatened by a disease caused by a microscopic soil-borne fungus, *Phytophthora cinnamomi*.

The fungus attacks the fine feeding roots, depriving its host of access to soil moisture and nutrients, with the result that most under-storey species and finally the jarrah trees themselves, succumb to protracted starvation.

P. cinnamomi does not attack the stem or branches of the tree and has no effect upon the strength or durability of the timber.

A free booklet describing in simple terms, the disease, the organism responsible and the known methods of control, is currently being published. This knowledge is essential to all forest users, sawmillers, tourists and the general public, if control measures are to be fully effective.

The booklet gives information, including colour photographs, on recognition of the disease.

Symptoms in jarrah are thinning of the crown and dying back of the tree's branches. The condition becomes progressively more severe until the tree succumbs. Death of the branches is merely an indication of the damaged root system and does not indicate the development of any disease in the above ground parts of the tree.

Diseased areas usually spread outwards slowly, however, the rate of movement can be quite variable depending on the forest type, site and the season.

The fungus

Fungi are lower forms of plant life which obtain their food either by parasitising living organisms or by decomposing dead organic matter. They may range in size from the relatively large mushroom to microscopic organisms undetectable to the naked eye.

Phytophthora cinnamomi causes serious disease in many plant crops and is widely distributed throughout the world, including the eastern and southern states of Australia. More than 400 plant species have been listed as being affected, including azaleas, camellias, peaches, plums, avocado, pineapple, oak, cypress, eucalypts and pines.

Available evidence strongly indicates that the fungus was introduced into Western Australia in the early years of this century, probably in infected soil on imported ball-stock.

Control

Photo mapping indicates that less than 5 per cent of the total forest area

Dieback area near Dwellingup. Scattered blackboys may survive on some sites.

A range of Eastern States eucalypts growing on a former dieback area.

is affected and that most of the infections occur on the poorer jarrah sites.

Control by fungicides or by mechanical means is theoretically possible but costs would be prohibitive for all but the most valuable agricultural crops. The best method of control in the forest is therefore to prevent the spread of the fungus into the 95 per cent of the forest area which has not yet been affected.

Spread of the fungus by natural means within the soil is very slow in comparison to its distribution by the transport of soil containing infected root material. Man, with his ability to transport large quantities of soil over great distances in a very short time, is the most efficient carrier of this disease into healthy areas.

Large volumes of soil are constantly being moved within the forest area on bulldozing, logging and road-building equipment and it is these units which constitute the greatest source of danger.

Prevention of this artificial spread is the greatest single step which can be taken to reduce the serious threat to our forests.

An intensive education programme of all forest users (sawmillers, S.E.C., P.M.G., M.R.D., shires and forestry personnel) is well under way. With the full co-operation of the sawmilling industry, logging prescriptions aimed at minimising the artificial spread of the fungus on infected machinery have been drawn up and are being implemented in all major sawmilling permits.

In localised and high value crops (nurseries, orchards, etc.) control may be achieved by soil sterilisation, fumigation or the use of fungicides. Due to the high cost of treatment, this approach is impractical on a forest scale and could only be used in very limited areas. However, physical barriers such as ditching and poison-band killing, draining of susceptible sites and replanting with resistant species have been used to control the natural spread of the disease within the forest area.

Rehabilitation of affected areas is essential if total timber production is to be maintained from State forests. Over 50 tree species with known commercial potential have been tested for resistance to *Phytophthora* so far and among these, three species of pine and at least five eucalypts have shown both a significant degree of resistance and the ability to become readily established on areas affected by dieback.

Field trials are continuing, but in the meantime over 600 acres are being rehabilitated each year using resistant species.

The oldest plantings of pinaster pine in a dieback area were established in 1950 and this species has grown in the diseased areas for 20 years without any ill effects.

Research

Research into various aspects of jarrah dieback is being carried out at Forests Department research centres at Como, Dwellingup and Manjimup. The Department has also sponsored two research scholarships at Australian universities. The Commonwealth Forest Research Institute is maintaining a research station at Kelmscott and has already sponsored two eminent forest pathologists to visit Western Australia and advise on avenues for research and possible control measures.

In November, 1969, the Forests Department organised a seminar on *Phytophthora cinnamomi* at the Como Institute of Forest Research and Protection. Twenty-seven research scientists from throughout Australia attended the proceedings.

Research into various aspects of *P. cinnamomi* is currently being undertaken in the Eastern States, where damage from this fungus is considered to be of economic importance to both forestry and agriculture.

Resistance of other W.A. forest types

Work to date indicates that karri (*E. diversicolor*), marri (*E. calophylla*), wandoo (*E. wandoo*), and blackbutt (*E. patens*), the other important timber species in this State, are resistant to the disease. The local plantations of *Pinus pinaster* and *P. radiata* also appear to be safe.

Three-year-old planting of Pinus pinaster *in a dieback area.*