

FUSARIUM CIRCINATUM IN PINE NURSERIES: A GUIDE TO APPROPRIATE MANAGEMENT STRATEGIES



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Pine seedling infected with *F. circinatum*

INTRODUCTION

A number of *Fusarium* spp. have been found to cause diseases of pine seedlings and cuttings in South African nurseries. *F. circinatum*, the causal agent of pitch canker of mature pines, is the most important of these pathogens and now occurs widely in South African commercial pine nurseries. The disease caused by *F. circinatum* has also been recorded in field situations particularly at establishment. The following descriptions and recommendations apply specifically to *F. circinatum* but most would also be applicable to other pathogenic *Fusarium* spp. found in nurseries.

SYMPTOMS

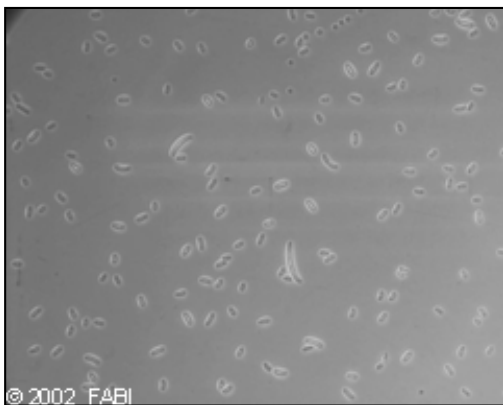
On seedlings, *F. circinatum* causes a serious root and root collar disease which results in the shoot tips wilting. The plants also change colour having an almost bluish tinge. Other symptoms include tip die-back and chlorotic or



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Dead and dying seedlings infected with *F. circinatum*

BIOLOGY

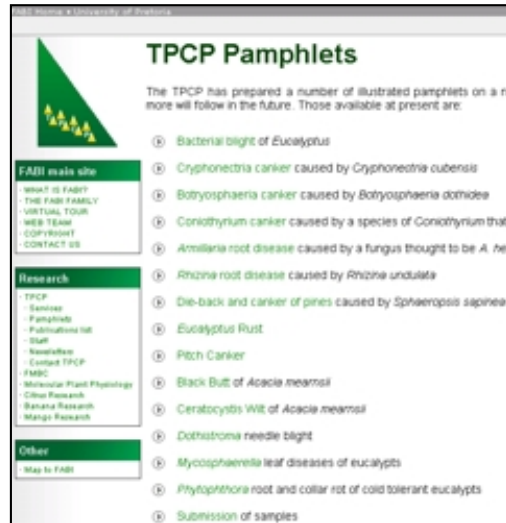
Fungal spores (conidia) are airborne and maximum dispersal occurs during precipitation and turbulent air conditions. Conidia are also soil- and water-borne. The fungus is an opportunist and enters wounds made by insects, mechanical injury and weather-related injuries. An increase in the incidence of the disease has been found to be associated with stress factors such as drought and excess fertilization. *F. circinatum* is also seedborne, occurring both within the seed and on the seed coat.



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Conidia of *F. circinatum*

MANAGEMENT STRATEGIES

Irrigation water should be treated chemically by using a chlorination system or ozone treatment. The



INSECT CONTROL

Insects are known to be vectors of *F. circinatum* or wounding agents allowing infections to occur. Thus, the use of insecticides can play an important role in reducing the number of vectors and/or wounding agents. The role of fungus gnats as vectors of this fungus has yet to be proven, although there is strong anecdotal evidence to suggest that they play a role. Through the implementations of good nursery hygiene practices, such as preventing water from accumulating in the nursery, the number of gnats in a nursery can be reduced. The following insecticides are not registered for use on pines although nursery managers have made use of deltemethrin and cypermethrin (chemicals complaint to FSC standards).

CHEMICAL CONTROL

The fungicides listed below are not registered for use on pine. They should, therefore, be used with caution and phytotoxicity tests should be undertaken prior to their use. A single systemic fungicide should not be used

reddish brown needle discoloration. Resinous lesions on the stems, root collars and tap roots are also occasionally evident on diseased seedlings. In South Africa, the disease is more common in older seedlings (more than 4 months old).

recommended dosage of chlorine is 2-3 ppm after the water pH has been corrected. Strict nursery hygiene practices must be maintained at all times. Please refer to the Tree Pathology Co-operative Programme (TPCP) pamphlet on Guidelines on hygiene practices in pine nurseries, [here](#). Some of the practices discussed in this pamphlet include the need to use pathogen-free seed, growth media and containers.

continuously as resistance to such chemicals can develop. A common practice in pine nurseries is to remove the dying seedlings and drench seedling trays with a fungicide. Some of the fungicides that have been used to control *Fusarium* outbreaks include prochloraz manganese, tebuconazole and propamocarb hydrochloride (chemicals compliant to FSC standards).

This pamphlet has been compiled by the Pine Fusarium Working Group, an initiative of nursery managers employed by various South African Forestry Companies.

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