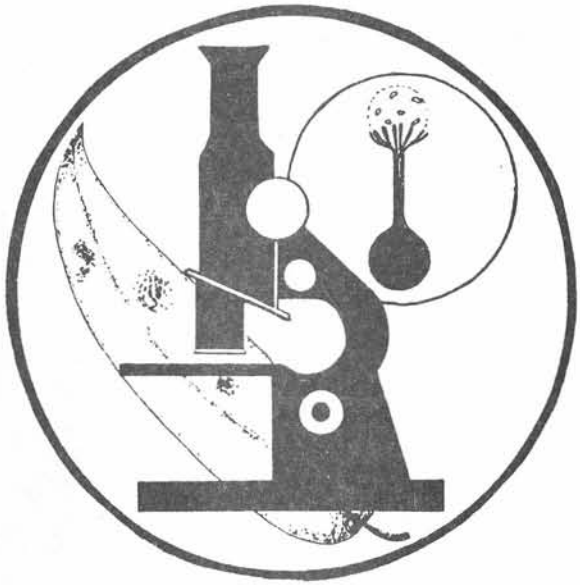
No 3

TREE PATHOLOGY NEWS

NEWSLETTER OF THE TREE PATHOLOGY COOPERATIVE PROGRAM
U.O.F.S.

JUNE 1991



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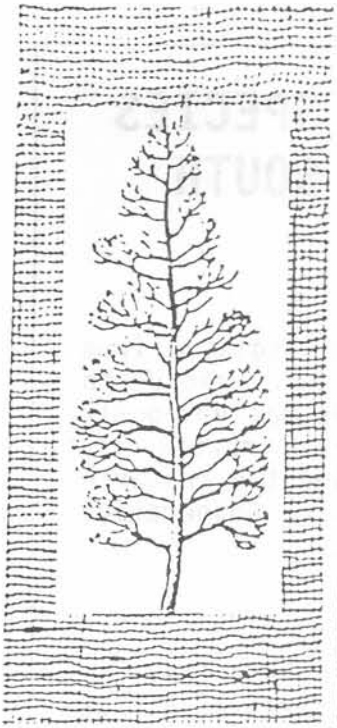
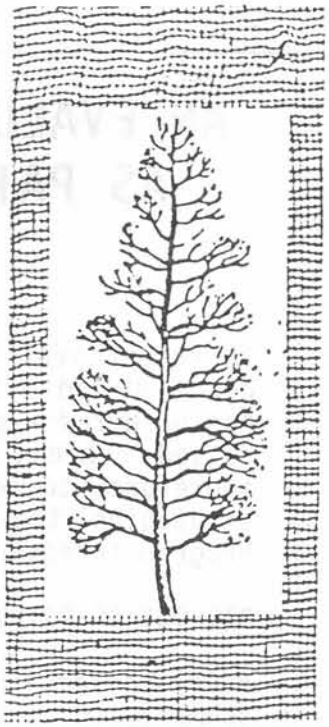


THE RESEARCH TEAM OF THE TREE PATHOLOGY COOPERATIVE PROGRAM

The research team of the Tree Pathology Cooperative program is varied. It includes full time staff of the University of the Orange Free State (Prof. M.J. Wingfield, Mr. W.J. Swart and Mr. G.H.J. Kemp), colleagues and students attached to other organisations such as Ms. N. Knipscheer of the ICFR and Mr. P.W. Crous of PPRI, technical assistants funded by the University or through membership fees and post graduate students (at present seven) who are mainly funded by the CSIR/FRD. Staff from various of the Departments in the University obviously provide advice and support where this is required.



IMPORTANT : READ THIS

Some difficulty has been experienced during the last few months with the receipt of samples sent to the Tree Pathology Cooperative Program for diagnosis. These have been sent to various members of the TPCP team as well as to the general University address. In order to us to coordinate our services to you please help us by using the following contact address:

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AN EVALUATION OF BOTRYOSPHAERIA SPECIES AS PATHOGENS OF EUCALYPTUS IN SOUTH AFRICA

In recent years, *Botryosphaeria* spp. have increasingly been isolated from diseased and dying *Eucalyptus* in South Africa. In many cases, tree death has occurred rapidly and losses have been significant. This has obviously raised concern amongst foresters. The aim of this brief review is, therefore, to add perspective to the situation and to outline the research strategies that are being followed by the Tree Pathology Cooperative Program to ensure that losses are avoided or at least, reduced.

BIOLOGY OF BOTRYOSPHAERIA

Botryosphaeria spp. are best known as opportunistic pathogens and they are commonly found on senescent plant tissue. In this context, species such as *B. dothidea* can be found on leaves, branches or roots of *Eucalyptus* spp., that have died of diverse causes such as herbicide damage, drought, or the action of primary pathogens. In addition to their saprophytic, or mildly pathogenic nature, *Botryosphaeria* spp. are also known to be virulent pathogens of woody plants in many parts of the world. They usually require wounds to infect hosts and are often, but not necessarily associated with stress situations.

BOTRYOSPHAERIA ON EUCALYPTUS IN SOUTH AFRICA

Consistent with their opportunistic nature, *Botryosphaeria* spp. have been found associated with a wide variety of disease situations in South Africa. These include leaf and shoot blight, rapid die-back of young trees, stem cankers (including those developing after hail damage) root disease, die-back of ramets in clonal hedges and death of cuttings in nurseries. They are therefore commonly encountered in forest plantations in South African and inoculum (spores) of these fungi is abundant. In this sense, the pathogen-complex closely resembles *Sphaeropsis sapinea* which is an opportunistic pathogen, associated with a wide variety of pine diseases in South Africa and elsewhere in the world.

CONTROL OF BOTRYOSPHAERIA DISEASES AND FUTURE RESEARCH STRATEGIES

Diseases caused by opportunistic pathogens are notoriously difficult to control. Stresses or environmental conditions conducive to infection by *Botryosphaeria* spp. can virtually be expected to occur at any time during the relatively long rotations associated with woody crops. The primary approach to reducing losses must thus be to carefully identify the various conditions associated with infection and then, to attempt to avoid these conditions. This can be achieved through careful selection of sites for species known to be sensitive to stress. This would be the equivalent of not planting pine species known to be highly susceptible to *Sphaeropsis* die-back in areas where hail is commonly encountered.

The research program of the Tree Pathology Cooperative Program has actively been studying *Botryosphaeria* diseases of *Eucalyptus* for the past three years. Results of our investigations suggest strongly that at least two

but probably more species of *Botryosphaeria* are associated with the disease complex. It is likely that the conditions associated with infection of the various species differs and it is, therefore, important that these fungi be carefully identified. Careful definition of the *Botryosphaeria* species and their biology will considerably improve our ability to exercise avoidance strategies in the future.

Preliminary results of our research indicate that clones of *E.grandis* differ in their susceptibility to infection by *Botryosphaeria*. Considerable losses have therefore been encountered in certain clones. The implications of this observation are both positive and negative. The possibility exists that extensive areas could be planted to particular clones that are highly susceptible to this disease complex. This would obviously result in considerable and unacceptable losses. However, if high levels of tolerance to *Botryosphaeria* diseases does exist amongst clones, it should be possible to capitalise on this tolerance. Consequently, arrangements are currently being made to establish field trials for artificial inoculation and screening of *E. grandis* clones for resistance to *Botryosphaeria*.

The severe losses of certain clones of pure *E. grandis* due to *Botryosphaeria* diseases has led to considerable concern. In some cases, these losses might also tempt foresters to consider removing the majority of pure *E. grandis* clones from planting programs. We believe that this would be premature and that many pure *E. grandis* clones in this country will prove to be tolerant to this disease complex. Selection of clones for future plantings should best be based on field experience and hopefully also artificial screening programs.

SUMMARY

1. The incidence of *Botryosphaeria* diseases of *Eucalyptus* has increased considerably in recent years and these disease are now amongst the more important problems affecting the South African forestry industry.

2. *Botryosphaeria* spp. are opportunistic and the primary strategy for reducing losses due to these fungi will be through avoidance. This will necessitate careful study of the conditions associated with disease.

3. There are indications that certain clones of *E. grandis* are tolerant to *Botryosphaeria* spp. Field screening and selection for tolerance to *Botryosphaeria* spp. must therefore be established.

4. At this stage, we believe that it would be premature to exclude pure *E. grandis* clones from planting programs. However, where particular clones have been seriously damaged, the planting of these clones should perhaps be curtailed. The principle of utilising large numbers of clones should also be continued and stringently adhered to.

5. Because of it's opportunistic nature, the damage caused by *Botryosphaeria* is often compounded by physiological stress. All efforts should thus be made to avoid growing trees under stressful conditions.

FACTORS ASSOCIATED WITH SPHAEROPSIS SAPINEA-INDUCED DIEBACK OF PINES FOLLOWING HAIL DAMAGE.

Factors affecting the infection of pine trees by *S. sapinea* have generally been poorly studied. Following a hail storm on 3 February 1986, an extensive outbreak of dieback induced by *S. sapinea* was recorded in the Southern Cape Forest Region from Ruiterbos to Kruisfontein State Forests. This outbreak provided a unique opportunity to determine the rate of symptom development and the effect of site index, altitude and tree age on infection of the hail damaged trees by *S. sapinea*. Studies of this nature have not before been conducted anywhere in the world.

The study area was located half-way between the forest stations of Kruisfontein and Harkerville. Aerial photography was used to investigate the distribution of trees infected by *S. sapinea* in relation to other stand/site characteristics. Three plots of 0,25 ha each, differing in site quality, were established in a 13 year old stand of *Pinus radiata* that had been hit by hail. Trees in the sample plots were rated for: (i) "total foliage" as a percentage of the total foliage on visibly healthy trees having more than 90% green foliage; (ii) "green foliage" as a percentage of the total existing foliage on the tree; (iii) top condition: "living" (green) or "dead" (discoloured).

These investigations revealed several important facts. Firstly, the intensity of damage by *S. sapinea* was not related to tree age. Secondly, it was found that the severity of infection by *S. sapinea* was heaviest in enclosed valley sites and sheltered stands, where conditions were ideal for *S. sapinea* infection due to higher humidities and smaller temperature fluctuations. Thirdly, there was no clear indication that foliage damage, dieback of tops and tree mortality was related to site index. Unfortunately, no data reflecting the role that the drought, which preceded the hail storm, might have had on the severity of damage caused by *S. sapinea* were obtained. Quantitative measurements of the amount of physiological stress that pine trees were subjected to, before and after the hail storm, would have contributed greatly to our understanding of the epidemiology of *S. sapinea*.

Several recommendations for the control of *S. sapinea*-induced dieback emerged from this study. The most significant of these is that pine species susceptible to *S. sapinea* should not be planted in enclosed valleys or in small groups sheltered by other stands in areas prone to hail. Intensive thinning, pruning and weeding operations should be applied if such planting is unavoidable. This will create microclimatic conditions less conducive to infection and reduce physiological stress resulting from inter-tree competition.

VERSAMELING EN VERPAKKING VAN PLANT- EN GRONDMONSTERS VIR DIE ANALISE VAN BOOMPATOGENE

Alle versendings na die Boompatologie Koöperatiewe Program moet eers telefonies bespreek word sodat die nodige voorbereidings getref kan word. Analises van monsters is geweldig duur (±R500,00/kultuur) wat die telefoniese bespreking, korrekte versameling en verpakking noodsaak. Versendings moet ook vergesel word van 'n skrywe wat die volgende inligting bevat:

1. Naam van die distrik
2. Naam van die plaas/kwekery
3. Vaknommer
4. Genus en spesie, of hibried spesifikasies van gasheer
5. Simptoom beskrywing
6. Ouderdom van gasheer
7. Agtergrondinligting soos reën, winde (warm of koud), hael, ryp en temperature.

Alle monsters, behalwe kwekery-, grond- en wortelmonsters, moet eers in papiersakke verpak word en daarna in plastieksakke geplaas word.

Dit is noodsaaklik dat alle monsters so spoedig moontlik na die laboratorium van die Boompatologie Koöperatiewe Program aan die Universiteit van die Oranje-Vrystaat versend word. **Enige koerier dienste word hiervoor aanbeveel.**

1. Blaarmonsters

Indien blare siekte letsels toon, kan takke met blare van die siek sowel as gesonde bome versamel word. Blare met alle moontlike letsel-variasies moet ingesluit word. Hoe groter die monsters is wat versamel word, hoe akkurater is die analise.

Die gesonde blaarmonsters moet van die siek blaarmonsters geskei word. Indien die vermoede is dat daar meer as een siekte voorkom, moet die onderskeie monsters ook apart verpak word.

2. Stammonsters

In die geval van jong bome, waarvan die stamme nie te dik is vir koerier versendings nie, word 'n segment van die stam met die letsels of kankers verwag. Daar moet seker gemaak word dat die segment met letsels of kankers verteenwoordigend is van die probleem in die spesifieke gebied of vak.

In die geval van ou bome, waar die stamme te dik is vir versending, kan bashout of saphoutmonsters versamel word. Die monsters wat versamel word, moet ou letsels, nuwe letsels, asook monsters waarop beide gesonde en letsel weefsel voorkom, insluit.

3. Wortel- en grondmonsters

Wortelmonsters moet wortelsegmente met voldoende haarwortels bevat. Die bodem van 'n plastieksak moet bedek word met grond vanuit die direkte omgewing van die haarwortels. Wortelsegmente moet bo-op die grond geplaas word en die sak moet opgevul word met dieselfde grond tot een kilogram in totale massa. Indien die grond droog is moet dit aangeklam word.

4. Kwekery monsters

Enige monsters vanaf die kwekerye moet die totale saailing of steggies met groeimedium insluit. Die monsters moet gesonde sowel as siek saailinge of steggies bevat en weereens apart verpak word.

Die groeimedium van die saailinge en steggies moet met klam handdoekstof bedek word en in **plastieksakke**, nie papiersakke, verpak word.