
UNIVERSITI PUTRA MALAYSIA

# THE INFLUENCE OF MANAGEMENT AND SILVICULTURAL PRACTICES ON THE INCIDENCE OF HEART ROT IN ACACIA MANGIUM PLANTATIONS

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# THE INFLUENCE OF MANAGEMENT AND SILVICULTURAL PRACTICES ON THE INCIDENCE OF HEART ROT IN *ACACIA MANGIUM* PLANTATIONS

By

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## GLOSSARY

| | |
|---|---|
| DBH | Diameter at 130 cm from ground level. |
| Decay | Decomposition of woody tissue by micro-organisms. |
| Infected | Containing a parasitic organism. |
| Isolate | To obtain a micro-organism from its substrate or host and establish it in pure culture. |
| Mycelium | A mass of hyphae, sometimes differentiated to form a special structure but more often the undifferentiated Vegetative state of a fungus. |
| Resistance | The power of a plant to overcome partially or totally the effects of a pathogen. |
| Susceptible | Not immune |
| Zone lines | Narrow dark lines transversing decayed wood. |

Abstract of thesis submitted to the Senate of Universiti Pertanian Malaysia in fulfilment of the requirements for the degree of Master of Science.

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Chairman : Associate Prof. Dr. Ahmad Said Sajap

Faculty : Forestry

*Acacia mangium* Willd., a major exotic timber species used in the Compensatory Forest Plantation Program for the production of sawlogs, was found to be infected by heart rot. To evaluate the incidence and severity of heart rot in *A. mangium* plantations, a study consisted of laboratory investigations and field surveys was conducted. The laboratory studies include isolation of fungi from infected tree, determination of wood density, microscopic observations, and chemical wood analyses. Field surveys were conducted at five plantations, namely Rantau Panjang Forest Reserve (RPFR), Bukit Tarek Forest Reserve (BTFR), Kemasul Forest Reserve (KFR), Setul Forest Reserve (SFR), and Ulu Sedili Forest Reserve (USFR).

Heart-rotted wood was lower in density and produced lower content of holocellulose, cellulose, lignin, pentosan, and extractives, but contained higher proportion of ash than the sound wood. The decay was identified as a white rot caused by a basidiomycete fungus from the family Polyporaceae. "Pick test" was found to be reliable in distinguishing sound heartwood from heart-rotted wood.

Heart rot incidence was found higher in the bigger diameter trees. An average of 80.8 percent incidence was recorded in trees at all sites. However, its incidence varied among the sites ranging from 66.9 percent at SFR to 97.4 percent at RPFR. The incidence and severity of heart rot at all sites except for SFR showed no relationship with the stand age. Stands established from Malaysian seed source exhibitted lower infection of heart rot than those of Australian seed sources.

Silvicultural practices such as initial spacing, singling, pruning, and thinning have evidently influenced the incidence of heart rot. The susceptibility of the trees against heart rot varied among the provenances and site. Provenances from Sidie, Indonesia and Abergowrie S.F., Queensland recorded the lowest proportion of heart rot, whereas provenances from

Claudie River and Broken Pole Creek, both from Queensland, Australia, recorded the highest heart rot proportions.

In conclusion, the present management and silvicultural practices of *A. mangium* for sawlogs production have had predisposed the trees to heart rot infection. However, the incidence and severity of heart rot within the trees in these plantations could be minimized through efficient management and silvicultural practices.

Abstrak tesis ini dikemukakan kepada Senat Universiti Pertanian Malaysia untuk memenuhi keperluan Ijazah Master Sains.

**PENGARUH AMALAN PENGURUSAN DAN SILVIKULTUR TERHADAP KEJADIAN REPUT TERAS PADA TANAMAN *ACACIA MANGIUM* WILLD.**

Oleh

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Ogos 1993

Pengerusi : Prof. Madya Dr. Ahmad Said Sajap

Fakulti : Perhutanan

*Acacia mangium* Willd., spesies eksotik cepat tumbuh yang utama dalam Program Ladang Hutan Kompensatori untuk penghasilan kayu balak gergaji, telah dijangkiti oleh penyakit busuk teras. Untuk menilai kejadian dan keamatan busuk teras pada tanaman *A. mangium*, satu kajian yang merangkumi penyiasatan di makmal dan survei di lapangan telah dijalankan. Penyiasatan di makmal terdiri dari pemencilan kulat dari pokok yang dijangkiti busuk teras, penentuan kepadatan kayu, pemerhatian di bawah mikroskop dan penganalisaan kimia. Survei di lapangan telah dijalankan di lima tapak tanaman, iaitu Hutan Simpan Rantau Panjang (HSRP), Hutan Simpan Bukit Tarek (HSBT), Hutan Simpan Kemasul (HSK), Hutan Simpan Setul (HSS), dan Hutan Simpan Ulu Sedili (HSUS).

Kayu busuk teras didapati mempunyai kepadatan yang rendah dan menghasilkan kandungan holoselulosa, selulosa, lignin, dan ekstraktif yang lebih rendah dari kayu yang sihat, tetapi kandungan abunya adalah lebih tinggi. Busuk teras ini dikenalpasti sebagai reput putih yang disebabkan oleh sejenis kulat basidiomycete dari famili Polyporaceae. "Ujian cungkil" didapati memberi maklumat yang tepat dalam membezakan kayu yang busuk dari kayu yang sihat.

Kejadian busuk teras didapati terjadi dengan lebih kerap pada pokok yang mempunyai saiz perepang yang besar. Purata 80.8 peratus kejadian busuk teras telah dicatatkan pada kesemua tapak tanaman, berjulat dari 66.9 peratus di HSS ke 97.4 peratus di HSRP. Kejadian dan keamatan busuk teras disemua tapak tanaman kecuali di HSS didapati tidak mempunyai kaitan dengan usia dirian. Dirian yang ditubuhkan dengan menggunakan biji-benih dari Malaysia mengalami jangkitan yang lebih rendah dari dirian yang ditubuhkan dengan menggunakan biji-benih dari Australia.

Amalan silvikultur seperti jarak awal tanaman, pembuangan pucuk unjur berbilang (singling), pemangkasan dan penjarangan jelas mempengaruhi kejadian busuk teras. Kerentanan terhadap busuk teras adalah berbeza antara provenan dan tapak tanaman. Provenan dari Sidie, Indonesia dan Abergowrie S.F,