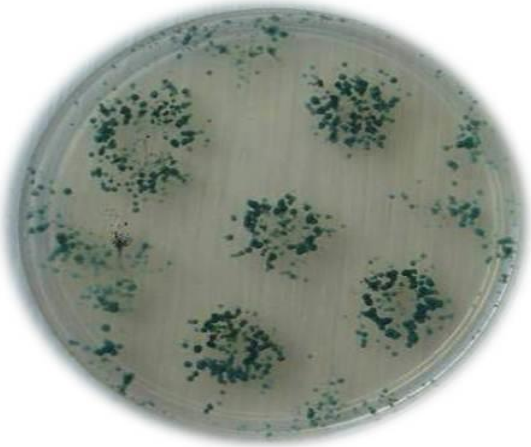
Boosting tree vigour and disease resistance

Endophytic fungi, or endophytes, reside entirely within host tissues and form symbiotic relationship with all plants including conifers. Certain endophytes are contributing to plant adaptation to stresses, such as drought, diseases, heat, heavy metals, insect and animal browsing, and sometimes can also promote plant growth and nutrient acquisition.



Pure culture of Trichoderma endophyte on agar plate

A particular group of fungal endophytes, the *Trichoderma* species, resides in the root tissue and has been demonstrated to have the ability to promote growth and increase disease resistance in plantation tree species. Dr Robert Hill, a world renowned *Trichoderma* expert from the Lincoln University Bioprotection Centre, has successfully applied selected indigenous *Trichoderma* isolates on *Acacia mangium* container seedlings in Sarawak and significantly enhanced seedling vigour and health. At operation scale (not trial plots) average wood volume was increased by 48% two years after planting from inoculated trees compared to non-inoculated controls. Endophyte inoculation is now a standard operation in Sarawak *Acacia* nurseries and over half a million hectares of Acacia plantations are now using endophyte-inoculated seedlings.
At PF Olsen's container nursery, we are collaborating with Dr Hill to incorporate selected and highly effective New Zealand *Trichoderma* endophytes into our radiata pine seedlings. Container seedlings are particularly suitable for root endophyte inoculation as the root system remains fully intact at planting allowing the benefits of root endophytes to be fully exploited.

Dr Hill is currently the project leader of a forestry endophyte research programme funded by the NZFOA. The main focus of this project is to induce systemic resistance in pine trees against foliar diseases by using endophytes and elicitors. Induced resistance can effectively "immunise" or "vaccinate" trees against a variety of diseases/disorders. This is because certain endophytes can trigger a broad spectrum physiological and biochemical activities in the plant. Hundreds of *Trichoderma* isolates are currently being tested in the lab followed by nursery trials at the PF Olsen Nursery. The most promising isolates are further tested in field trials and 15 field trial have been established in the past two years.

The goal of PF Olsen's container nursery is to deliver treestocks to our clients with not just the best genetics and a "packed lunch" but also with a "first aid kit (vaccination against diseases) to ensure their survival, vigour and long-term performance once they are planted in the field.

Endophyte inoculation works particularly well with containerised treestocks – they not only get a "packed lunch" , but also a "first aid kit"

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