

The Impact

of *Rosellinia necatrix* white root rot on South African macadamia orchards

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Rosellinia necatrix is a fungus that causes white root rot disease in many economically important crops across the world. Symptoms of *R. necatrix* white root rot are often indistinguishable from other root diseases, and include wilting and drying of foliage as well as the presence of white, cotton-like growth on infected roots.

A survey conducted in 2020 suggested that the fungus is currently not prevalent in South African macadamia orchards. Beaumont seedlings were infected with *R. necatrix* to determine their susceptibility and if the fungus was able to cause disease to macadamia trees. To prevent the spread of *R. necatrix* in orchards, good management practices are recommended. Continual monitoring is also proposed to check for the presence of the disease via submission of root samples to the FABI Disease Diagnostic Clinic.

Rosellinia necatrix is a soil-borne fungus that causes white root rot disease in a variety of fruit and ornamental trees, especially apple and avocado. The fungus is spread through

contact with diseased root material and soil, leading to higher risk of spreading in densely populated orchards (ten Hoopen and Krauss, 2006). Symptoms of *R. necatrix* infection are often indistinguishable from other common root pathogens, such as *Phytophthora cinnamomi*. Root symptoms include the presence of white, cotton-like growth on infected roots, discolouration of the roots as well as white mycelial “fans” between the bark and wood. Necrosis (brown discolouration) of the roots, general rot throughout the tree, and death occur during the final stages of infection (Pérez-Jiménez, 2006; ten Hoopen and Krauss, 2006). Aerial symptoms may manifest rapidly or progressively, but are all characterised by wilting and drying of leaves, ultimately resulting in tree death. Infected trees subjected to stress may

exhibit signs of slow growth, loss of foliage and dieback of branches and foliage (Pérez-Jiménez, 2006).

In South Africa, *R. necatrix* has been found in apple and pear orchards in the Western Cape (van der Merwe and Matthee, 1974) as well as avocado orchards throughout South Africa (van den Berg *et al.*, 2018). In 2019, *R. necatrix* was detected for the first time in South African macadamia orchards by the FABI Disease Diagnostic Clinic. In 2020, screening of root samples from various farms in Limpopo and Mpumalanga was conducted for the presence of *R. necatrix*, but the pathogen was only detected in samples from a single farm in Limpopo and two farms in Mpumalanga.

To understand if *R. necatrix* may indeed have a negative impact on macadamias in South Africa and to better understand the progression of disease symptoms in macadamias, a pilot infection trial was conducted on Beaumont seedlings. Chopsticks inoculated with the fungus were placed into soil next to the stems of seedlings (Fig 1). White cotton-like growth was observed on roots after four weeks (Fig 2). Additional brown discolouration of roots and more white growth was detected after six weeks (Fig 2). Aerial symptoms were only observed after six weeks, with foliage wilting and dying.



Figure 1. Pathogenicity trials. Healthy seedlings at the start of the trials (A); chopsticks overgrown with the pathogen (B); are inserted into soil close to stem of seedling (C).

Based on the results of our preliminary survey, *R. necatrix* is not currently prevalent in South African macadamia orchards. We have, however, confirmed that *R. necatrix* is pathogenic towards macadamias, and large-scale spread and infections could potentially result in economic loss and/or death of the plant.

Recommendations to industry

Currently there are no registered chemical control options for white root rot on macadamia in South Africa. Fluazinam is used for control of white root rot on other crops and an emergency registration for avocado is currently pending. We thus advise farmers to practise good orchard management in response to white root rot infection. Removal of dead organic material from orchards as well as thorough cleaning of machinery after use in orchard blocks affected by white root rot should minimise the spread of the pathogen. When replanting seedlings, care should be taken not to place them into spaces left by trees killed by white root rot.

We would also recommend constant monitoring of orchards for presence of the symptoms associated with white root rot. This includes the submission of properly sealed diseased root samples in paper bags, as screening for the presence of *R. necatrix* has become part of the FABI disease clinic's standard operating procedure. Care should be taken not to mix different parts of a diseased tree, such as stems and roots, when bagging. The submission of samples showing symptoms should proceed as quickly as possible to ensure samples are not overgrown with secondary pathogens, greatly reducing the odds of determining the actual cause of death.

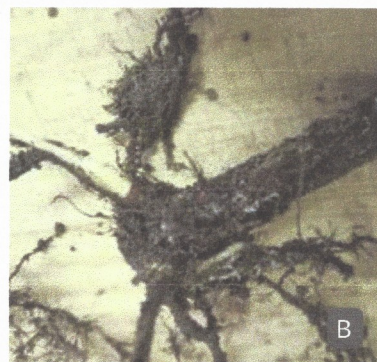


Figure 2. Aerial symptoms observed after six weeks of pathogenicity trials. Note dying of foliage from top to bottom. (A) Root symptoms observed after four weeks; (B) presence of white cotton-like growth; (C and D) root symptoms after six weeks and tree death; root discoloration and white growth underneath bark.



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