*Jeremy Klaasen -*
*ARC Infruitec-Nietvoorbij, Stellenbosch 7599*

# ROSELLINIA ROOT ROT OF APPLES

*Rosellinia necatrix* is the causal agent of white root rot disease of apple and pear trees in South Africa, and is highly destructive in nurseries as well as in mature orchards.

*Rosellinia necatrix* (anamorph: *Dematophora necatrix*) is the causal agent of white root rot disease of apple and pear trees in South Africa. Other potential hosts reported in literature include: citrus, grapes, olives, pistachio, walnut, boysenberry, loganberry, strawberry, loquat, fig and mango. The disease is highly destructive in nurseries as well as mature orchards and becomes severe under wet soil and high temperature conditions.

## Symptoms

In older trees the first symptoms noticed are yellowing and premature fall of the leaves. These symptoms sometimes develop further until die-back of certain branches or the whole tree occurs.

In the case of young trees, root damage could occur so rapidly that die-back takes place within one season. The first signs will be wilting and yellowing of the lower leaves. In most cases the leaves are retained after the tree has died. Symptoms below ground are very distinctive. Under moist soil conditions the affected crown and roots, as well as the adjacent soil, will be covered with white cottony sheets of fungal growth.

During very wet conditions and also where weeds and grass grow around the trunk, the white, fanlike fungal sheets often appear a few centimeters above the soil surface on the bark of the infected tree.

## Identification

When an infected tree trunk is placed in a black plastic garbage bag with moistened paper for a week, white mycelial sheets resulting from the branching of rhizomorphs (specialised mycelial growth) are observed on the bark. The fungus grows well on potato dextrose agar growth media and can be readily identified by the greenish-grey colour of the older hyphae, and the pronounced pear-shaped swellings at the distal ends of the cells of these older hyphae.

***Rosellinia necatrix* mycelial sheets on replanted apple trees.**

***Rosellinia necatrix* mycelial sheets on mature apple tree trunks.**

## Biology and Epidemiology

This pathogen does not have host specialization. It is a facultative parasite that also survives in the soil in the absence of a host. It attacks all the roots, remaining localized in the bark and pith, without affecting woody tissues. The fungus grows by forming white plaques resembling white finger-like sheets. The symptoms induced are due to phloem destruction and the production of toxins transmitted by the sap.

The main dispersal means are the mycelium and mycelial strands and not the spores produced by the fungus. The mycelium penetrates through "infection cushions" (sclerotial-like masses) on the surface of infected older tissues or enters by infiltrating the outer cells on the young roots. The mycelium requires high moisture content for growth (modern irrigation systems favour the development of the fungus). The fungus also needs a high level of organic matter as a source of nutrition and grows well at pH 5-7.

## Control

Despite research efforts and a great body of theoretical control recommendations, no practice or product has been proven 100% effective in controlling white root rot of apples.

Several cultural practices can contribute to diminishing the disease: soil solarisation, good drainage, limiting irrigation, organic fertilisation and by avoiding the use of sites where the disease had been detected previously. Soil solarisation in South Africa has not been effective in established orchards and is therefore not recommended.

Fumigants are safe and effective when properly used, but special training is highly recommended for first time users. Before using any chemicals, carefully read and follow safe handling instructions and use protective clothing and equipment as stated on the label.

The integration of biological control agents in the management of white root of apple has shown variable success rates. According to research results the application of antagonistic microorganisms can improve control after chemical drenching or fumigation, or in combination with chemical drenches where compatibility of the microorganism and the chemical has been ensured.

## Rootstock resistance

No differences in susceptibility of different rootstocks were found in studies with Northern Spy, M 793, M 26, MM 101, MM 105, MM 109, M 110, MM 111, MM 112, MM 113, MVII. All rootstocks readily died after inoculation with Rosellinia.

**REFERENCES**

J. J. H. VAN DER MERWE & MATTHEE F. N. 1971. Crown and root rot of apple trees. Deciduous Fruit Growers 21:75 – 78.

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**Wilting and browning of the leaves of a young pear tree infected with Rosellinia.**

***Rosellinia necatrix* fan-like mycelial sheets on an apple tree shoot.**

**Greenish-grey colour of older hyphae and white mycelial sheet of Rosellinia.**

**Young die-back trees in a pear orchard infected with Rosellinia.**

**Leaf discolouration on apple trees infected with Rosellinia.**

For more information, contact the Disease Management Division, ARC Infruitec-Nietvoorbij.
Tel: 021 809 3169, fax: 021 809 3002

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