

Breeding for Resistance to and Biocontrol of Phytophthora cinnamomi Root Rot Progress Report

J.A. Duvenhage and S. Kremer-Köhne

Merensky Technological Services. P.O. Box 14, Duivelskloof, 0835.
E-mail:mts@pixie.co.za

ABSTRACT

Since funding started in 1994, the rootstock breeding programme has delivered several promising selections which exhibit resistance to *Phytophthora cinnamomi*. These selections are being cloned and will be retested in the mistbed in comparison to Duke 7. The best selections will be planted (30 each, grafted with Hass) in a highly *Phytophthora cinnamomi* infested orchard in 1999. Trees will then be evaluated for yield and resistance to root rot over 6 years.

Three fungal antagonists namely *Paecilomyces lilacinus*, *Aspergillus candidas* and *Trichoderma hamatum* have been tested for root rot control in newly planted, as well as in established avocado orchards since 1993. Soil populations of *Aspergillus candidas* and *Trichoderma hamatum* tended to be higher in soils from treated trees than control trees, while *Phytophthora cinnamomi* populations in soils from treated and control trees did not differ significantly. Soil suppressiveness of antagonist treated trees tended to be higher than that of control trees, and the tree condition of antagonist treated trees tended to be better than that of control trees. Yields of antagonist treated and control trees did not differ significantly.

BREEDING FOR RESISTANCE TO ROOT ROT

The avocado rootstock breeding block currently contains 17 different rootstocks which are resistant to *Phytophthora cinnamomi*. These trees are used as parent trees for breeding, and undergo open pollination. Pollen from commercial avocado cultivar is excluded from the breeding block by the remoteness of the breeding block from commercial orchards.

Seedlings from this block are screened for resistance to root rot by exposure to a virulent strain of *Phytophthora cinnamomi* in a mistbed. The seedlings are planted in *Phytophthora* infested vermiculite and evaluated for root health in comparison to Duke 7 clonal rootstocks (which is the standard commercial rootstock). So far, 20 preliminary selections have been made. Selected seedlings are now cloned and retested (10 of each) in the mistbed as described above.

The best selections will be planted during 1999 in an old avocado orchard which is heavily infested with *Phytophthora cinnamomi*, after removal of the old avocado trees.

These rootstocks will be evaluated for yield (grafted with Hass), and resistance to root rot over a period of 6 years.

BIOCONTROL OF ROOT ROT IN THE ORCHARD

Since 1992, three fungal antagonists (*Paecilomyces lilacinus*, *Aspergillus candidus* and *Trichoderma hamatum*), which have previously been proven to control root rot of avocado under glasshouse conditions (Duvenhage & Kotzé, 1993), were tested under orchard conditions (Duvenhage & Köhne, 1996; 1997). Firstly antagonist treatments were applied to the planting medium of Fuerte and Hass trees on Duke 7 rootstock when the trees were transplanted in the nursery, and subsequently annually to the soil after planting in the field in 1992 (Duvenhage & Köhne, 1995). Secondly, antagonist treatments were applied to the soil of Fuerte (Guatemala seedling rootstock) and Hass (Duke 7 rootstock) trees planted in 1981. Tree condition, yield, populations of antagonists and *Phytophthora cinnamomi*, as well as suppressiveness of soils were monitored annually as described by Duvenhage & Köhne (1995).

Since 1993, tree condition of antagonist treated trees tended to be better than that of untreated control trees, while yield of treated or control trees did not differ significantly. Soil populations of *Aspergillus candidus* and *Trichoderma hamatum* tended to be higher in soil from trees treated with these antagonists than in soil from control trees. However, populations of *Phytophthora cinnamomi* in soil from antagonist treated and control trees did not differ significantly. Soil suppressiveness of antagonist treated trees tended to be higher than that of control trees.

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