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PHOMOPSIS PERSEAE THE CAUSE OF TRUNK CANKER OF MARTIN GRANDE AVOCADO ROOTSTOCKS IN SOUTH AFRICA

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ABSTRACT

Phomopsis perseae *was isolated from cankerous lesions on the trunks of Martin Grande (G755) avocado rootstocks. Kochs' postulates were carried out and proved that* P perseae *is pathogenic to Martin Grande rootstocks. P* perseae was *not pathogenic on Duke 7 rootstocks* in vivo. *Benomil gave complete control of P* perseae in vitro.

P perseae has been isolated from leaves of *Perseae grattisima* (americana) 1940. Zerova (1940) proved in glasshouse inoculation studies that the fungus is pathogenic to avocados.

In March 1990 a newly planted orchard with Mass grafted on Martin Grande and Duke 7 rootstocks was damaged by a hailstorm. Copper oxychloride sprays were applied afterwards.

During June/July the first symptoms of yellowing and die-back of leaves were noticed. It seemed that the trees in the cooler areas of the estate were more severely infected.

At further investigation the PVA paint (applied for sun protection) was stripped from the bark and black lesions were noticed, which at that stage had girdled the stem (Figure 1). The lesions stretched through the cambium and xylem, spreading upwards and downwards. No apparent symptoms showed on any of the roots. Within a period of six months over a thousand trees were lost.

Isolations were made from crown and trunk samples of Martin Grande and sent to the University of Pretoria. Samples were sterilised in 3% NaOCl for 1 min, rinsed twice in sterile distilled water and blot-dried aseptically. Material isolated were plated out on potato dextrose agar (PDA) with amended chloramphenicol (Cl = 250 mg/ℓ) and a selective medium for *Phytophthora cinnamomi* (PARPH). Four different isolates were obtained on the PDA + Cl but no fungus growth appeared on PARPH-medium.

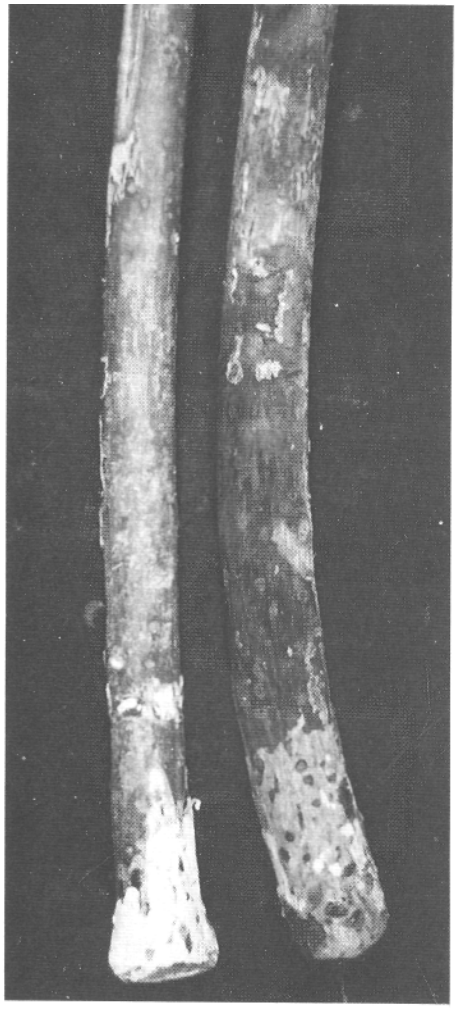

Fig 1 Martin Grande rootstocks with PVA paint stripped from the stem with black lesions clearly visible on the trunk on the right infected with *P perseae*.

At the same time cuts, ca 10 mm in length were made with a sterile scalpel in the stem of four-month-old *P schiedeana* Nees selection G755 cuttings which were sprayed beforehand with a 70% EtOH solution and were inoculated with small strips of xylem taken from the infected plants and were covered with sterile wet cotton wool and masking-tape.

After incubation at 26—28°C for four days, necrotic lesions developed around the sight of inoculation (Figure 2). These necrotic lesions increased progressively in circumference in the phloem and necroses could also be detected in the xylem that spread acropetal and basipetal. *P perseae* (of which the name was unknown at that stage) was isolated from the periphery of the lesions after surface sterilisation with 3% NaOCl for 1 min and a double rinse in sterile distilled water. The four different isolates obtained from the samples plus the *P perseae* isolated from the symptoms produced by xylem inoculation on G755 cuttings were grown on PDA for six days.

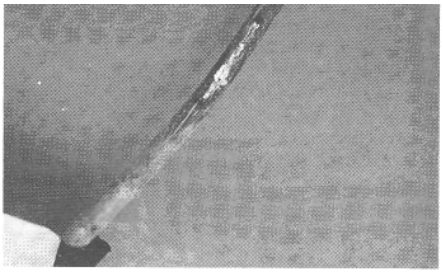

Fig 2 *P schiedeana* Nees selection G755 cutting six days after inoculation with a strip of xylem taken from infected field rootstock.

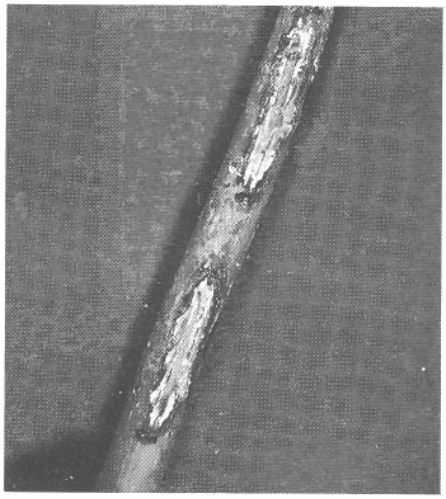

Fig 3 Lesions on Martin Grande cutting three days after inoculation underneath the bark with a strip of *P perseae* culture.

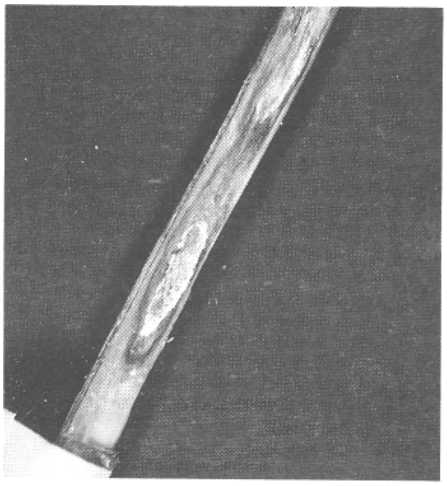

Fig 4 Lesions in the xylem of Martin Grande cutting three days after inoculation underneath the bark with a strip of *P perseae* culture. The same plant as seen in Figure 3 now with the bark stripped.

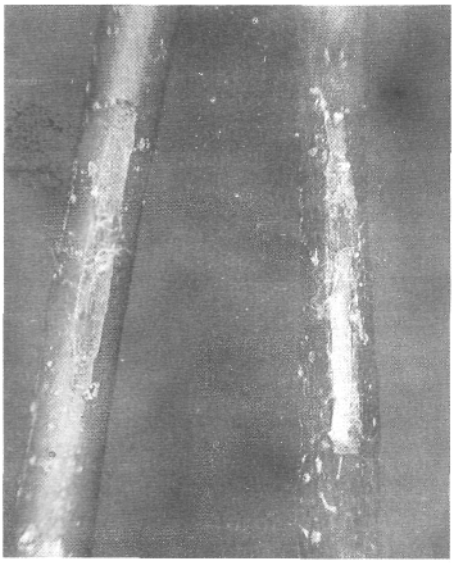

Fig 5 Pathogenecity of *P perseae* clearly visible on the trunk of Martin Grande cuttings after inoculation with strips of *P perseae* culture which were pressed against the wound.

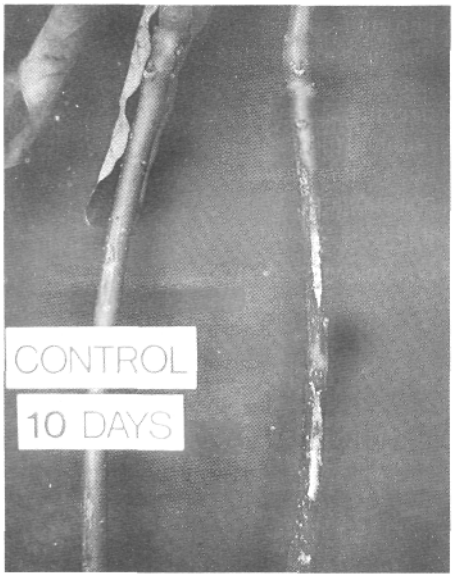

Fig 6 Symptoms of Martin Grande cuttings clearly visible ten days after inoculation with *P perseae*.

Longitudinal slits ca 10 mm x 2 mm were made into the bark of Martin Grande seedlings. Strips of the *P perseae* ca 10 mm x 2 mm containing mycelium were cut from each of the five different six-day-old cultures grown on PDA.

These mycelium strips were then placed under the strips of bark and covered with sterile wet cotton wool and secured with masking tape. Five inoculations were performed for each culture. Two of the five cultures gave necrotic lesions similar to those initially produced on the Martin Grande, after inoculation with small strips of xylem from infected sample. The one was the culture isolated from the latter and the other one was obtained from the original samples. These two cultures proved to be the same isolate. Five out of five inoculations of both cultures gave symptoms and the same cultures were reisolated from all ten lesions (Figures 3 and 4). No symptoms developed from the other isolates.

The pathogenicity of *P perseae's* on Martin Grande was tested by using a sterile scalpel to scrape the outer layer of bark. Inoculations were performed as described previously, except that the mycelium containing strips were now pressed against the wound and not put under the bark. Fifty per cent of these inoculations produced symptoms expressed by *P perseae* and a 100% reisolation of the fungus were conducted from these lesions (Figure 5). Within ten days the inoculated trees were completely girdled and the lesion spread up and down the stem (Figure 6) and within 20 days the inoculated plants were completely dead and dried out (Figure 7).

The same tests were conducted on Duke 7 but no symptoms appeared after inoculation.

Benomil and Captan were tested *in vitro* against *P perseae.* These two fungicides were amended in half strength ADA at different concentrations and 5 mm discs of a six-day-old culture of *P perseae* were placed on the different plates containing different concentrations of the fungicides.

Ten days after inoculation Benomil still gave complete control of *P perseae in vitro* at a concentration of 1 ppm active ingredient. Captan failed to control *P perseae in vitro* even at a concentration of 100 ppm ai.

Bark, crown and trunk cankers thus far reported in South Africa were respectively caused by *Pseudomonas syringae* Van Hall (Korsten & Kotzé, 1987) and *Phytophthora cinnamomi* (Lonsdale, Botha, Wehner & Kotzé, 1988). This is the first report of *Phomopsis perseae* Zerova causing trunk canker of avocado in South Africa.

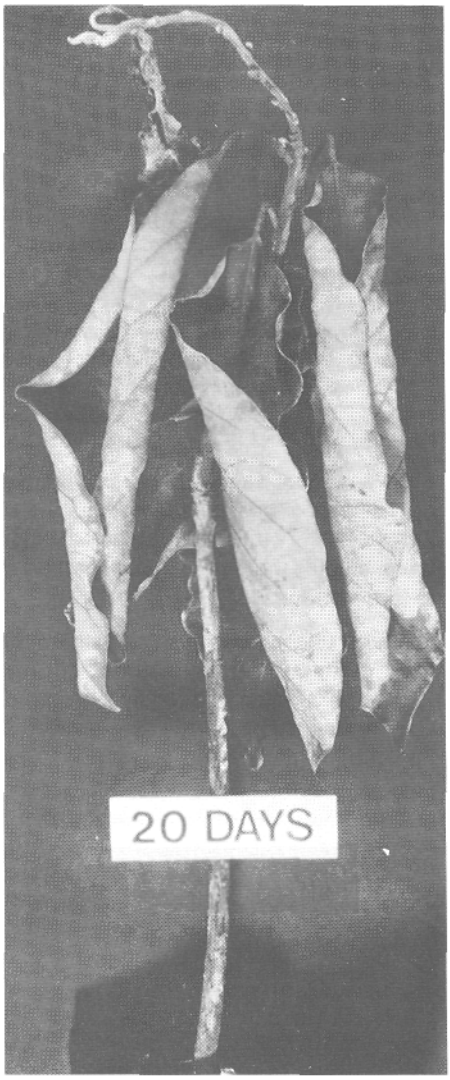

Fig 7 Twenty days after inoculation with *P perseae* the Martin Grande cuttings were completely dead.

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