South African Avocado Growers' Association Yearbook 1988. 11:27-28

PHYTOPHTHORA CINNAMOMI, THE CAUSE OF CROWN AND TRUNK CANKER OF DUKE 7 AVOCADO ROOTSTOCKS IN SOUTH AFRICA

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ABSTRACT

Phytophthora cinnamomi *was consistently isolated from cankerous lesions on the trunk and crown of avocado trees on Duke 7 rootstocks not treated with Phosetyl-Al or Metalaxyl. Isolates of* P cinnamomi *from these lesions caused symptoms resembling those observed in the field upon artificial inoculation of the lower trunk of juvenile clonal Duke 7. The fungus was readily re-isolated from artificially induced lesions.*

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Phytophthora cinnamomi *is konsekwent geïsoleer uit kankeragtige letsels op die stamme en krone van avokadobome op Duke 7-onderstamme wat nie met fosetiel-Al of metalaksiel behandel is nie. Isolate van* P cinnamomi *uit hierdie letsels het in kunsmatige inokulasiestudies simptome soortgelyk aan die in die veld by klonale Duke 7-boompies veroorsaak. Die swam is geredelik uit die kunsmatlg-geïnduseerde letsels herisoleer.*

Different *Phytophthora* spp have been found associated with stem cankers in the USA and in South America, eg *P citricola* Sawada (Zentmyer, Jefferson and Hickman, 1973; Coffey and Cohen, 1984; Tourney, 1984), *P heveae* Thomson (Zentmyer, Klure and O'Neal, 1976) and *P cinnamomi* Rands (Hörne, Klotz and Rounds, 1941; Zentmyer, 1959). The only canker of avocado thus far reported from South Africa is a bark canker, presumably caused by *Pseudomonas syringae* Van Hall (Korsten and Kotzé, 1987),

In 1985, crown and trunk cankers were first observed on Duke 7 avocado rootstocks in the Tzaneen area, South Africa by J M Darvas (J J Bezuidenhout, Westfalia Estate, personal communication). This paper describes this canker disease and shows that *P cinnamomi* is the causal pathogen.

Sampling was conducted in the Tzaneen and Hazyview areas to record the incidence and symptomology of crown and trunk canker on avocado trees. Cankers were excised, refrigerated and transported to the laboratory. Segments, ca 3 mm^3 in size were cut from the periphery of the lesions, surface sterilised with 0,1 per cent $HgCl_2$ for 30 seconds, rinsed twice in sterile distilled water, blot-dried aseptically and plated on potato-dextrose agar (PDA) and on P10VP medium (Tsao and Guy, 1977). Plates were incubated at 27°C for four to six d, and the fungi that developed from the tissue segments were isolated and identified.

Two isolates of *P cinnamomi* which were recovered from cankerous lesions, were cultured for five d on PDA. These cultures were used to inoculate fivemonth-old juvenile clonal Duke 7 plants grown in methyl bromide fumigated soil. Inoculation was done by making a longitudinal slit *ca* 10 mm long and 2 mm deep at the base of the trunk of each seedling with a sterile scalpel. Mycelium containing strips, *ca* 10 x 2 mm in size, were cut from the *P cinnamomi* cultures, placed on the slits in the trunks and secured with waterproof plastic tape. Five seedlings were inoculated with each isolate. Control seedlings were treated the same as those inoculated with *P cinnamomi,* but strips of sterile PDA were used instead of cultures of the fungus. After inoculation, plants were placed in a greenhouse at 25 - 32°C. The tapes were removed after two weeks. Symptom development was observed at regular intervals and re-isolations were made as previously described.

Crown and trunk cankers were found only on three to four-year-old Duke 7 rootstocks grafted with Hass or Fuerte scions. Conspicuous cracks were present in the bark at the base of the trunk of affected trees (Figure 1). These cracks extended below soil level, but not as far as the root system. Infected bark was discoloured and often covered with a whitish crystalline exúdate. A dark, sunken, necrotic lesion which penetrated the outer wood, occurred under the bark (Figure 2). Although the cankers invaded a considerable portion of the lower trunk of severely infected trees, no girdling was observed. Diseased trees generally showed lack of vigour, reduced foliage and dieback,

P cinnamomi (unknown mating type) was consistently isolated from cankers on trees which had not been treated with phosetyl-AI or metalaxyl, but only occasionally from trees to which these fungicides had been applied. Isolates of *P cinnamomi* from these lesions conformed to all criteria for the species (Waterhouse, 1963, 1970; Waterhouse and Waterston, 1966). *Fusarium oxysporum* Schlecht emend Synd and Hans and *F solani* (Mart) Appel and Wollenw emend Snyd and Hans, infrequently developed from plated segments of diseased tissue.

Cankerous lesions resembling those observed in the field developed on all the juvenile clonal Duke 7 plants artificially inoculated with the two isolates of *P cinnamomi.* A necrotic area surrounding the inoculation site was present in the bark when the tapes were removed two weeks after inoculation (Figure 3).

These lesions progressively increased in circumference, and the outer cortical tissue also became necrotic with time (Figure 4). *P cinnamomi* was re-isolated from lesions on 70 per cent of the inoculated seedlings. No symptoms developed in any of the control plants.

This is the first report on crown and trunk canker of avocado caused by *P cinnamomi* in South Africa. The disease was observed only on young trees and apparently affects only Duke 7 rootstocks, since similar symptoms have as yet not been recorded locally on any other rootstock. Considering that Duke 7 exhibits moderate resistance to *P cinnamomi* induced root rot (Kellam and Coffey, 1985), this suggests a differential susceptibility of stem and root tissue to *P cinnamomi* In this rootstock.

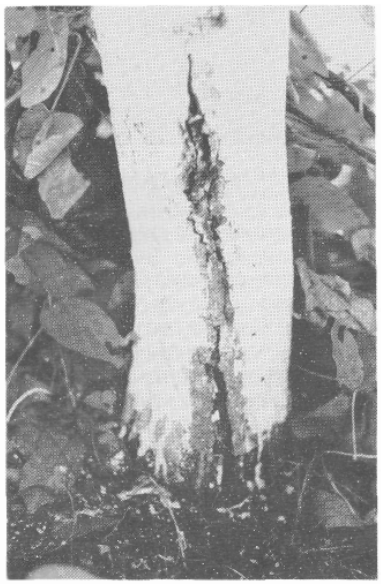

Fig 1 Cracks at the base of the trunk of a Hass tree grafted on Duke 7 rootstock in the field.

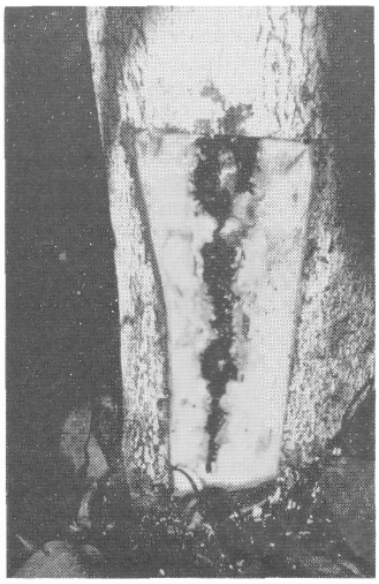

Fig 2 Dark, sunken necrotic lesion under the cracked bark.

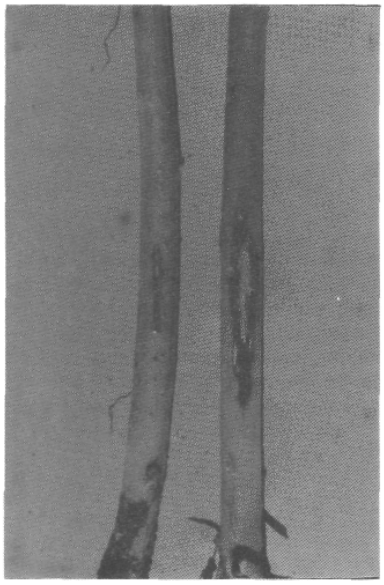

Fig 3 Cankerous lesions on the stem of a vegetatively juvenile clonal Duke 7 plants, artificially inoculated with *P cinnamomi*, three weeks after inoculation (right). Control seedling (left).

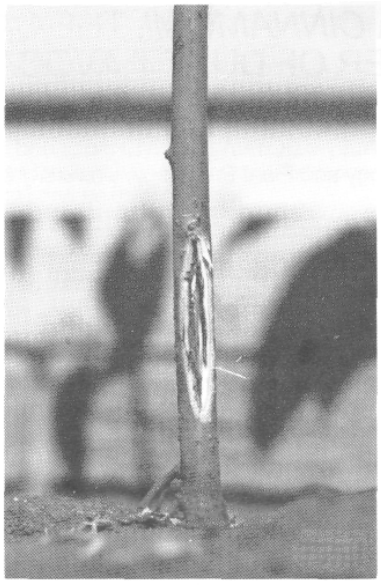

Fig 4 Infected tissue on the stem of a juvenile cloned Duke 7 plant, artificially inoculated with *P cinnamomi* three months after inoculation.

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