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AVOCADO SUNBLOTCH RESEARCH IN SOUTH AFRICA (1978)

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INTRODUCTION

Avocado sunblotch disease is a graft and seed transmissible disorder, and is assumed to be caused by a virus, although attempts to isolate virus particles and to find any by electron microscopy have been unsuccessful.

Affected trees have a sprawling style of growth. The mature bark possesses marked rectangular cracking while the young stems and the fruit frequently have yellow depressed streaks. Diseased trees often produce one or more apparently healthy branches which have vigorous upright growth and are devoid of any sunblotch symptoms. These are called "recovery growth" branches, which is a misnomer since they are latently infected with the sunblotch agent.

There are two forms of seed transmission. The one occurs at a low rate (0 - 5%) through seed from branches with symptoms and the infected seedlings display sunblotch symptoms. The other type occurs through seed from "recovery growth" branches and symptomless carrier trees. All their seedlings are symptomless carriers of the disease, but if used *as* rootstocks for healthy scion material, the latter becomes infected and displays typical sunblotch symptoms. The use of symptomless carrier trees as seed sources has probably been the main means by which sunblotch has been spread.

INDEXING

The most widely used method of indexing for sunblotch is to graft buds or bark strips from the tree under test onto healthy seedlings, and observe the growth of these seedlings for stem and sometimes leaf symptoms. It is not essential for the grafts to take. The symptoms can appear after 6 months, but usually take 10 - 18 months, thus it is advisable to watch the indicator plants for 2 years.

There is another indexing method where healthy graftwood is grafted onto seedlings of the tree under test. This method has been found to be unsatisfactory as it is slower, and graft-survival is essential.

Two years is a long time to wait, and therefore research is being directed towards finding a quicker method.

IMPROVING THE PRESENT METHOD

Mass seedlings are generally recommended as indicators, but we have found that Collinson is equally as good.

Indexing has usually been conducted in a screenhouse, but our research is showing that controlled glasshouse temperatures are better. In an experiment comparing different cultivars only 8 of the 72 seedlings inoculated had not developed symptoms after 12 months at 28°C. The quickest reaction was 63 days, and the Table shows the average time taken for symptom development.

TABLE: Comparison of three cultivars as indicators for sunblotch

Source	Time (days) for symptom expression		
	Collinson	Hass	Fuerte
Symptomed	117	197	278
"Recovery Growth"*	267	279	269
Rootstock Sucker*	291	269	295

*Symptomless carriers

A pilot experiment was then done using four temperatures ranging from 23° to 30°C. All four plants at 30°C developed symptoms within 4 months, while after 12 months there were still some negatives at the lower temperatures. A large scale experiment using Mass and Collinson is now under way.

BIOCHEMICAL TESTS

A quick laboratory test for sunblotch would be ideal, and so attention has been given to biochemical changes in avocado induced by the disease.

Increased peroxidase activity, decreased IAA oxidase activity and higher total phenols were found to be associated with symptoms in bark tissue, i.e. no differences between healthy and symptomless carriers were found. Some differences between them were found in polyphenoloxidase activity and total soluble proteins. Unfortunately the former test does not lend itself easily to large scale analyses, and the latter showed only slight differences.

Test on leaf tissue failed to show any differences. Chromatographie separation of phenols from leaf and bark tissue similarly failed to show any differences between healthy and infected plants.

OTHER STUDIES

Mechanical transmission

Experiments conducted in Nelspruit confirm earlier reports that sunblotch is not mechanically transmissible.

Thermal inactivation

Since mechanical transmission is not possible, tests for characterizing the virus such as thermal inactivation, dilution endpoint and longevity *in vitro* cannot be conducted. However experiments to determine thermal inactivation *in vim* have been carried out. Pieces of graftwood were treated in a steam bath at various temperatures for various times, and then bark strips were grafted onto indicator plants. The sunblotch agent survived 55°C for 15 minutes, but not 56°C for 15 minutes.

Rate of movement

Infected bark strips were grafted onto indicator seedlings, and then removed at various intervals. When they were left on for 2 weeks or more, sunblotch symptoms developed, but not if they were taken off earlier.

Host range

Attention has been given to plants belonging to the same family as the avocado, Lauraceae. Strips of infected bark have been grafted onto 6 related species. So far the only one to react is cinnamon. Two seedlings developed typical sunblotch stem symptoms and back inoculation to avocado confirmed that it is sunblotch.

Another relative is the false dodder, *Cassytha.* This plant has been established on infected avocados and trained across onto healthy plants. In one case so far one of the latter plants has developed symptoms.