Avocado Sunblotch Viroid (ASBV)

Avocado sunblotch disease was first recorded in California and has subsequently been reported in most avocado growing areas including Australia, Florida, Israel, Peru, South Africa, Spain and Venezuela. It is possible that the disease is more widespread because of symptom variability and the presence of symptomless carriers. Although initially thought to be caused by a virus due to its graft transmissibility, the disease was later shown to be caused by a viroid.

The symptoms of avocado sunblotch disease vary considerably and are influenced by cultivar, environmental conditions and viroid strain. Typical symptoms usually include stem streaks, lesions and discoloration of the fruit, and a variety of foliar symptoms. Importantly, some infected trees remain symptomless.

Fig. 34 Avocado sunblotch symptoms on the twigs, leaves and fruit of 'Hass'.

The most consistent symptom of sunblotch infection is the appearance of yellow, orange or white streaks on the stem and petioles. These streaked areas often darken and become depressed. Foliar symptoms usually appear as either chlorotic zones associated with vascular tissues, which commonly appear bleached, or as a general variegation of white, yellow or pink areas. In some cases, both symptom types are present on the one leaf. Leaves may also be deformed. Fruit produced from infected trees usually develop sunken white, yellow or red blotches or streaks and are usually small, deformed and unmarketable (Fig. 34). The bark can have a rectangular cracked appearance, often referred to as 'crocodile skin' or 'alligator hide'. The symptoms of sunblotch may be irregularly distributed throughout an infected tree. Severely affected trees are stunted and develop a low, sprawling habit that leads to increased exposure and injury from the sun. Fruit set and yield is also usually reduced.

Variants of ASBV of between 246 and 251 nucleotides have also been detected in diseased trees and four types have been identified in Australia. A discussion at the Bundaberg conference with Dr John Menge of the University of California prior to the study trip revealed that when variants are present in trees their may be up to a 10% reduction in their potential yield. He also indicated that infection by variants is likely through natural root-grafting between trees.

When visiting Florida we spent time with Dr David Kuhn who was based at the USDA-ARS National Germplasm repository near Miami. Sixteen ASBV variants had been identified in avocado trees by this group and it was emphasised that they are unstable viroid particles which readily mutated. Advice was received that there should be zero tolerance of ASBV or its variants in commercial avocado orchards.

New Zealand has been recently re-examining the viroid status of its industry using the Queensland University of Technology analytical services. It has been discovered that the same four variants found in Australian material are also present in New Zealand trees. Advice from New Zealand virology experts is that the avocado industry adopts a zero-tolerance policy on ASBV or its variants in commercial orchards. During the course of their investigation some doubt has been thrown on the reliability of analytical services provided by QUT in that split samples have tested both positive and negative **(Note: in a more recent conversation with Dr Rob Harding of QUT it was disclosed that the source of cross-contamination had been identified and steps taken to ensure that it would not be a further problem. Dr Harding gave assurances on the integrity of the ASBV analyses being carried out for the Australian industry)**. While there is no doubt that a positive test correctly identifies the status of the material two negative results are required before acceptance that the material is clean. New Zealand has recently sent coded material to Dr Barry Manicom of the ARC-Institute for Tropical and Subtropical Crops at Nelspruit in South Africa for testing. An indication of the reliability of this laboratory should be known by September, 2002.

Our knowledge on ASBV has steadily increased as new, more sensitive detection methods have been developed. With current knowledge it is recommended at this point in time that a zero-tolerance policy should be adopted for all trees being propagated and sold from ANVAS nurseries as soon as practicable and this be enforced through the routine sampling of leaves for ASBV analysis from nursery trees. This policy should be supported by rigorous testing of nuclear and multiplication blocks and that the Australian industry should work closely with the New Zealand industry in identifying a reliable and affordable indexing service. Recent literature pertaining to ASBV is attached in Appendix X.