Better control of avocado sunblotch disease through improved diagnostic technologies

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Avocados Australia

HAL

Know-how for Horticulture™

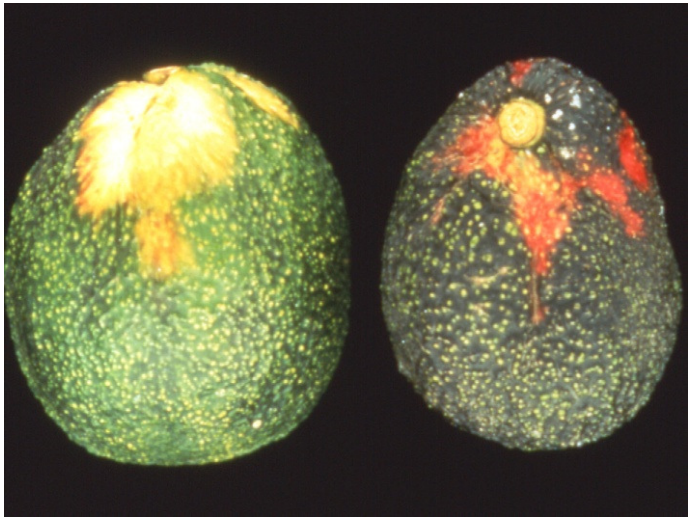
Queensland Government

Avocado sunblotch viroid (ASBVd)

- Smallest pathogen in the world (genome of 247 nts).
- Only detected using molecular methods or by grafting bark patches onto indicator host such as cv. Hass.
- Three strains: symptomless carrier (ASBVd-SC), variegation (ASBVd-V) and bleaching (ASBVd-B).
- Differences between strains very minor – a single mutation can result in change from ASBVd-V to ASBVd-B.

Economic impact of ASBVd

- Smaller and fewer fruit – estimates of yield loss range from 18-95%.
- Fruit disfigurement – more than half of fruit may be downgraded on quality standards.
- Symptomless carrier trees may still show significant yield decline.
- Quarantine restrictions may affect export of fruit from affected orchards.



Transmission of ASBVd

- Cannot be transmitted by insects.
- Cannot survive for any length of time outside of the plant (i.e. in the soil).
- Transmitted at a very high rate in seed.
- Transmitted in scions used for grafting.
- Probably transmitted at a low rate on the blades of pruning tools.
- Transmitted by root grafting.

Control of ASBVd

- Infected plants cannot be cured.
- Infected plants should be removed to prevent further spread – all living tissue must be destroyed.
- New blocks should be established with plants certified to be free of ASBVd:
  - i.e. from a nursery participating in the Avocado Nursery Voluntary Accreditation Scheme (ANVAS).

Objectives of research project

- To develop quality-assured diagnostic tools.

- To survey for ASBVd in south-east Queensland/northern NSW.

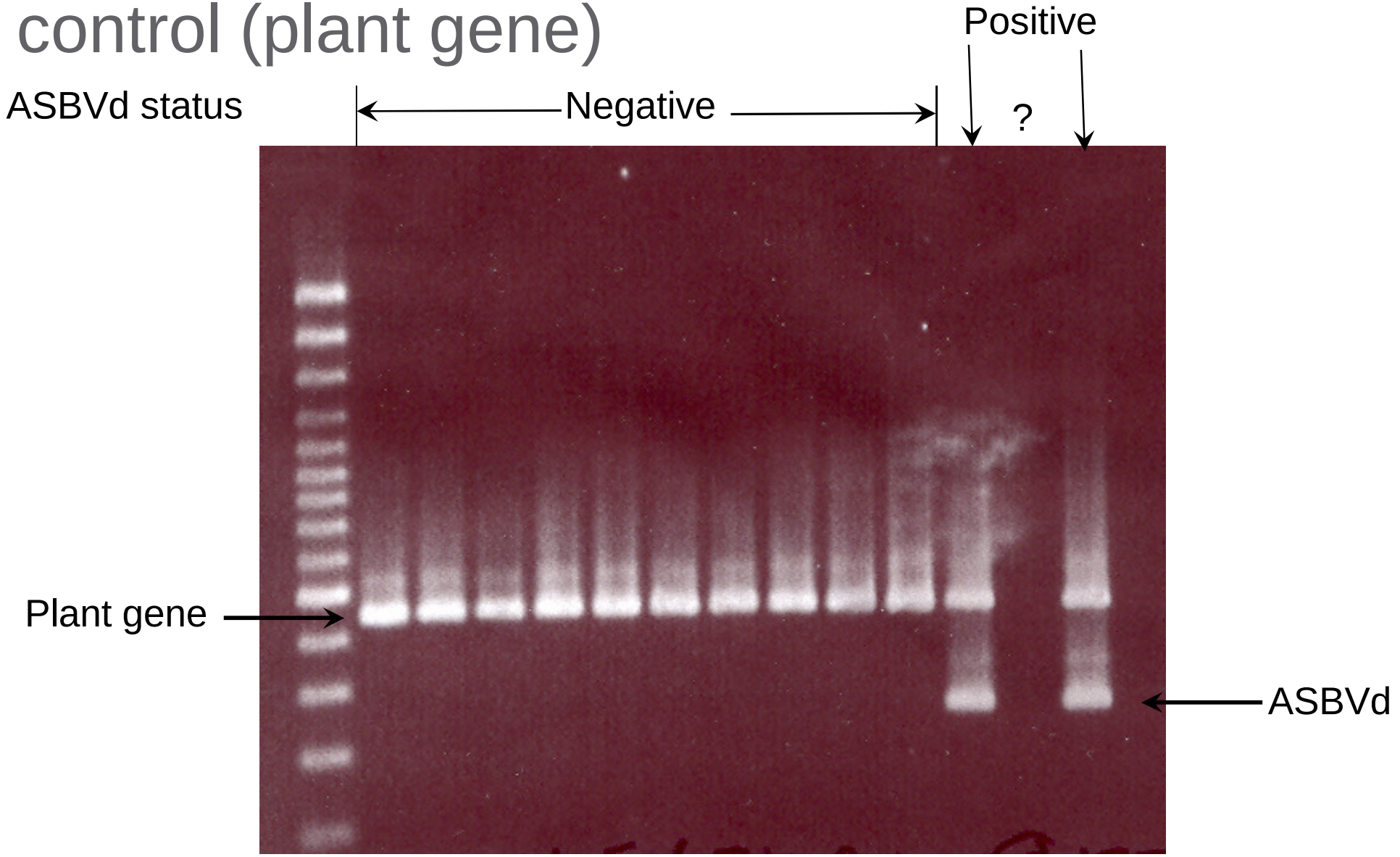
Quality-assured diagnostic tools

- Two types of error in diagnosis:
  - Healthy plant mistakenly diagnosed as infected.
  - Infected plant mistakenly diagnosed as healthy.
- The latter mistake is most serious.

Causes of error:

- Human error.
- Sample degradation.
- Sampling error.
- Assay inhibition.

New PCR assay for ASBVd including internal control (plant gene)



How significant a problem is ASBVd in Australia?

- ANVAS established in 1978.
- 34% of Australian avocado trees 6 years or younger.
- Less than 10 records of ASBVd from Australia and mostly from germplasm collections.
- Last published report of ASBVd was in 1989.

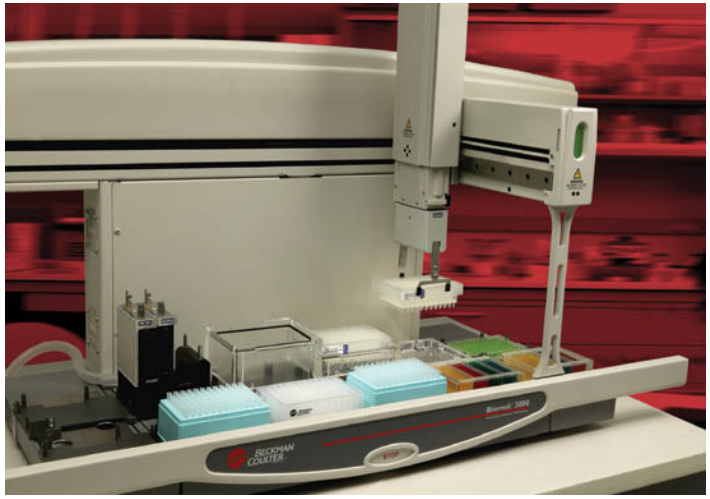
Question: Is ASBVd still present in Australia?

Verified records of ASBVd in Australia

- cv. Mexicola, Alstonville Research Station, NSW (1962, 1989) – budwood obtained from ‘interstate’.
- cv. Zutano AV35, 2 field trees, Coomealla, NSW (1981)
- cv. unknown, CSIRO Division of Horticultural Research, Merbein, Victoria (1981).
- cv. Carlsbad, post-entry quarantine, Canberra (1981).
- cv. Fuerte, field tree, Alstonville, NSW (1981).
- cv. Hass, 1 field tree, Red Cliffs, Vic (1981)
- cv. Hass, 2 field trees, Qld (1981)
- cv. Hass, 1 field tree, NT (1981).
- cv. Bacon, 1 field tree, Paringi, NSW (1989).

Surveys for ASBVd in south-east Queensland and northern NSW

- All trees in the multiplication blocks of Anderson Avocado Tree Nursery, Duranbah, NSW, and Birdwood Nursery, Woombye, QLD, have been tested and all were **NEGATIVE**.
- 2100 trees from commercial properties in south-east Queensland and northern NSW have been tested and all were negative, except:
  - One cv. Fuerte tree of age >20 years old. This tree was symptomless.



Conclusions

- ASBVd is very rare but not yet completely eradicated from Australia.
- ANVAS is successful and ASBVd progressively being eradicated.
- To ensure ASBVd-freedom, buy planting stock from accredited nurseries.
- If you suspect you have ASBVd, please talk to me at conference and we will test samples for free.

Acknowledgements

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- THANK YOU FOR YOUR ATTENTION