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AVOCADO RESEARCH IN NEW ZEALAND

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The avocado research programme in New Zealand is relatively recent. In my paper I have outlined the research programme and discussed the areas of work involved in pests and diseases.

Three major funding sources are available to the avocado industry for research and development:

- Avocado Growers Association
- Avocado Export Council
- Foundation for Research, Science and Technology. This is government science funding and, as such, is competitive; the government favours industries which support research and development through the provision of their own funding.

In total approximately NZ$300,000 is spent annually on avocado research in New Zealand of which about 40% is provided by the industry.

Research topics funded by the Avocado Growers Association include:

- Cultivar selection and evaluation
- Rootstock selection and evaluation
- Tree size and phenology
- Integrated pest management

Research topics funded by the Avocado Export Council include:-

- Handling, storage and marketing
- Post-harvest disease control
- Crop assessment

These two areas of research funding are administered by the Research and Development Committee.

Research topics funded by the Foundation for Research, Science and Technology include:

- Cultivar selection
- Rootstock selection
- Postharvest disease control
- Integrated pest management
- Tree size and phenology
- Postharvest disinfestation
- *Phytophthora* control

Avocado pest research in New Zealand

In New Zealand two types of insect or mites cause problems for avocado growers;

those that attack fruit or plants causing direct losses e.g. leafrollers, armoured scale; and those which do not cause damage but cause an adverse reaction by quarantine officials in importing countries i.e. oribatid mites.

Currently growers follow a regular spray programme to combat leafrollers and scale insects. Research is aimed at developing an integrated pest management programme to minimise the number of broad-spectrum insecticides used. Integrated pest management programmes are being developed for:-

Leafrollers control using *Bacillus thuringiensis,*

- timing of spray applications
- determining the relative importance of various species and levels of parasitism in orchards.

The most common leafroller species in New Zealand are:-

- Brownheaded leafroller
- Black lyre leafroller

(Both species also found in kiwi fruit orchards.)

Native leafroller eggs on fruit pose quarantine problems for avocado exports.

Armoured scales rarely cause direct losses but do cause fruit blemishes. These are particularly conspicuous on cv. Hass, the major export variety, which turn black on ripening. Two major species are involved i.e. greedy scale and latania scale.

Ecology and parasitism of these pests is being studied together with research on chemical control and modelling phenology.

Greenhouse thrips can cause roughening of full size fruit. The introduction of parasites from California or Australia is being considered for control.

Oribatid mites if present then export crops are fumigated. At present there is no satisfactory chemical control measure. However, oils have been used for control of oribatid mites on kiwifruit and dip treatments are presently under evaluation for avocado.

In general growers do not use an Intensive spray programme for insect pest control and there is a recognition that safe food is of importance to the consumer. Market access and the prevention of fumigation, which is detrimental to quality, are key factors for the New Zealand avocado industry.

Avocado disease research in New Zealand

The main areas of disease research in New Zealand are:

* Identification of pathogens,
* Identification of sources of infection,
* Timing of infection
* Chemical and other means of control.

Diseases which are of most importance in New Zealand are:

* Anthracnose *Colletotrichum spp.*
* Stem-end rots and neck rots) *Botryosphaeria spp. & Phomopsis sp.*
* Others *Fusicoccum* sp., & *Fusarium* sp.

Sources of infection

All the major pathogens can be isolated from living and dead wood within the canopy and in shelterbelts. The pathogens are found mainly in the extra-cambial tissues. The presence of the pathogens in the outer cortical cells is consistent with active development on twig surfaces and the initiation of neck rots via contamination of the freshly cut button at picking.

Timing of infection

Research has shown that infections early in fruit development are unlikely to be responsible for most of the postharvest rots of avocados in New Zealand.

Chemical control

Sportak (prochloraz) dips have been shown to give the most effective control of post-harvest rots in New Zealand and pose no problems for export to Australia, the major export market for New Zealand avocados. However, alternative control measures are required for export to markets with no prochloraz tolerance levels.

Benlate provides reasonable control of *Colletrotichum gloeosporioides* and acidified bleach (200 ppm available chlorine) provides some control and may be useful in 'organic' production systems. Monthly applications of copper (Kocide) provides satisfactory control of *Botryosphaeria* spp. and a switch to Benlate three months pre-harvest is more effective for post-harvest rot control when the incidence of *Phomopsis* sp. is high.

Recent research using three phosphonate sprays pre-harvest suggests there may be some control of *Botryosphaeria* spp. as well as providing some protection against *Phytophthora.* However, this is being further evaluated.

Biological control of post-harvest rots

Strains of *Bacillus subtilis* have been evaluated for use as biological control agents for ripe rots caused by *Colletotrichum* spp., *Botryosphaeria* spp., *Fusicoccum* sp., and *Phomopsis* sp. To date a New Zealand isolate, antagonistic in culture, did not provide satisfactory control when used as a post-harvest dip treatment.

However, it is considered essential to pursue biological control of postharvest rots and to this end collaborative research between Lise Korsten, from South Africa, Kerry Everett from New Zealand, and Lindy Coates from Australia has commenced. To overcome problems associated with Environmental Impact Assessments under the recently introduced New Zealand Biosecurities Act and registration for use in New Zealand it is important to isolate local strains of antagonistic micro-organisms which can be used for biocontrol.