Fruit diseases of avocado and how to manage them

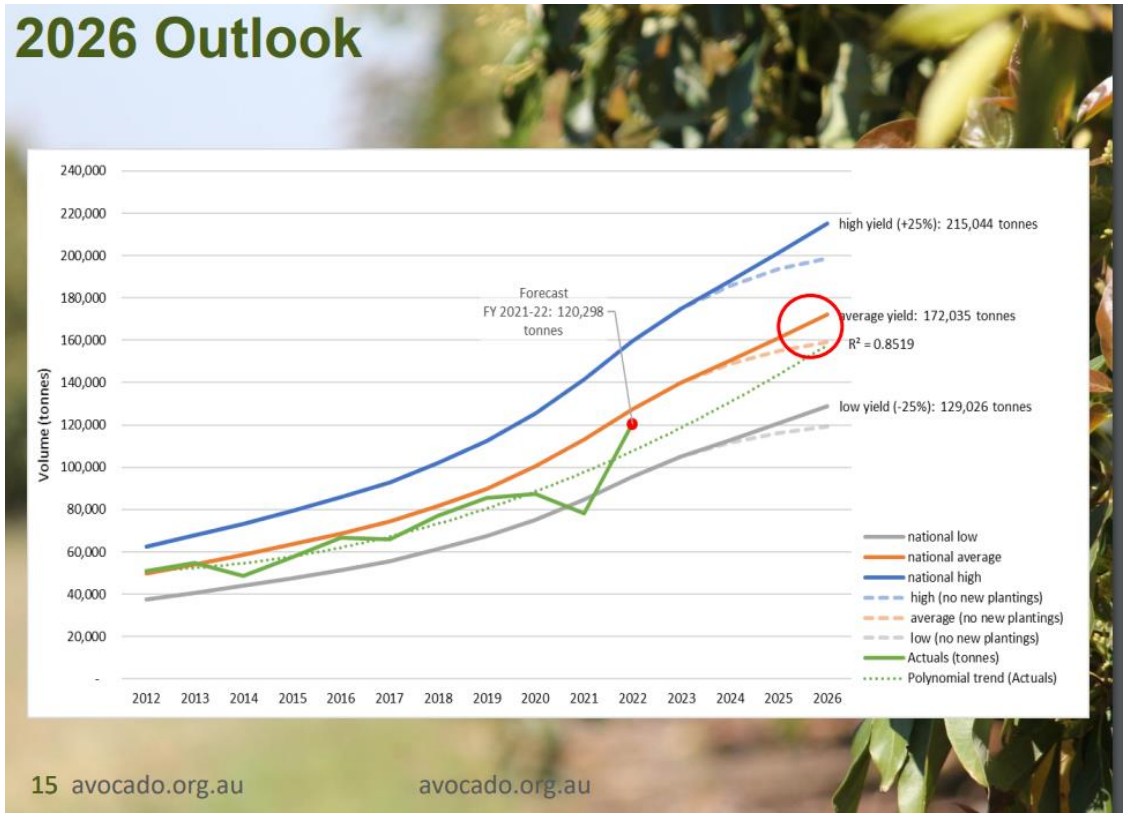
Elizabeth Dann

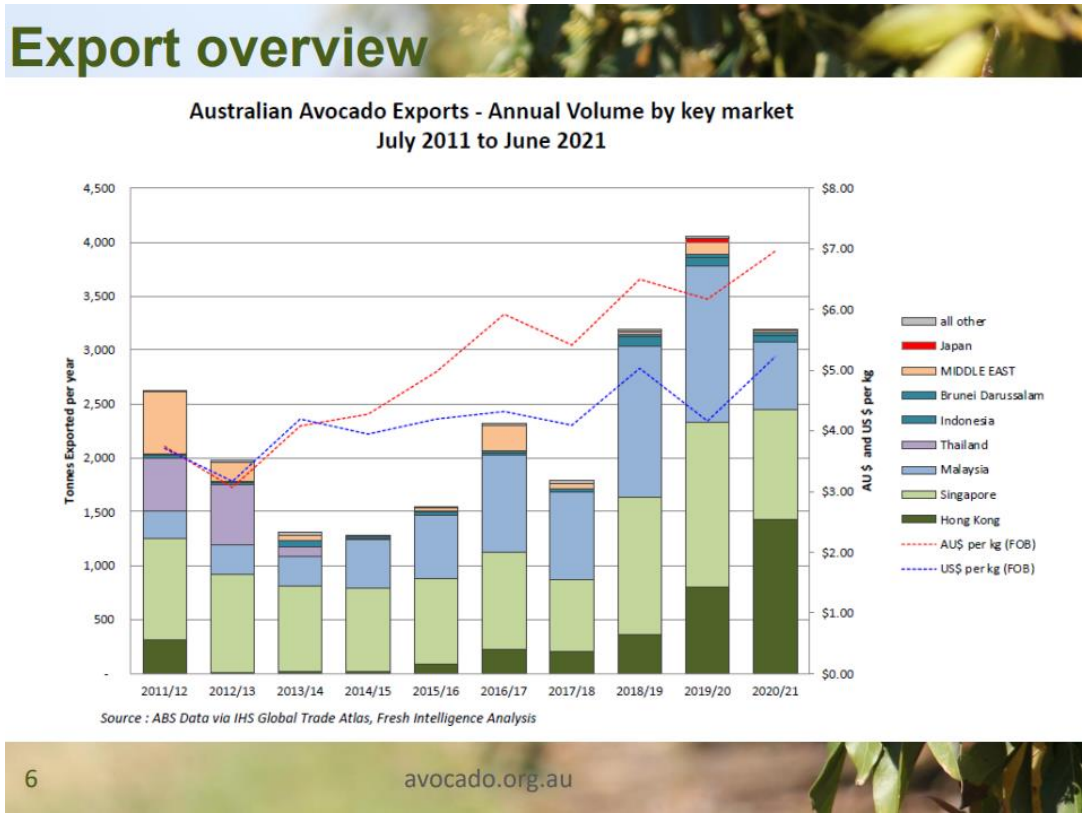
Tamborine Northern Rivers Regional Forum

Alstonville, NSW

1 June 2022

Why does quality matter?





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Why does quality matter?

- Increased production to est. 170K tonnes by 2026
- Longer in domestic supply chain
- Longer in export chain
- Extended shelf life and “robustness” is required
- Potential for unreliable transport and storage conditions
- Market-building phase critical
- Risk of damage to reputation from poor quality
- Risk of damage due to non-compliance with regulations, e.g. exceeding maximum residue limits (MRLs)
- Need to maintain premium price given our cost of production

➢ *Growers may need to change production practices*

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Fruit diseases

anthracnose

pepper spot

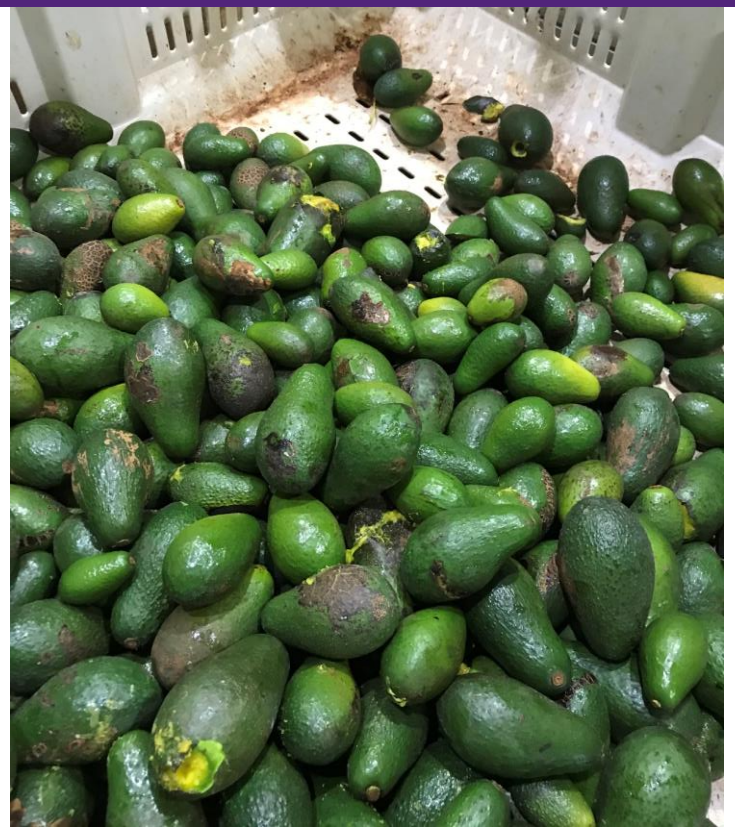
stem end rot

bacterial soft rot

E. Dann/grower

Bacterial soft rot

- *Pectobacterium (Erwinia) carotovorum*
- Seen in field, but more commonly in ripening fruit, greenskins
- Occurs after very wet, windy conditions, low-hanging or damaged fruit
- Discard fruit, do not put through packingline
- Putrid smell



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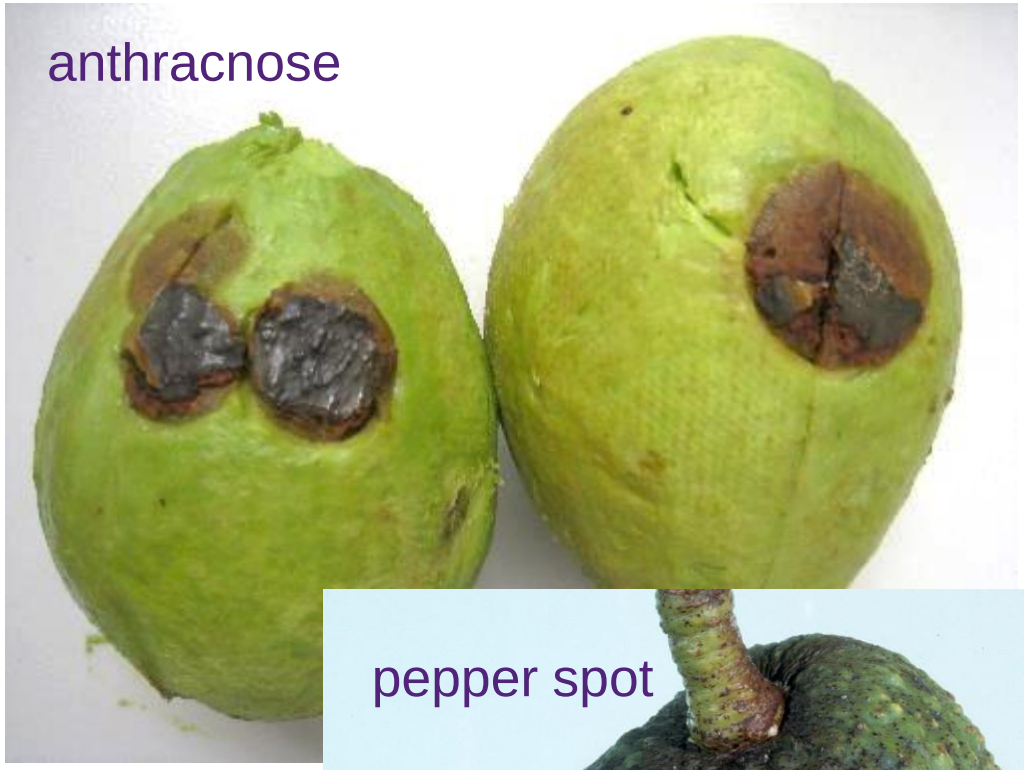
Colletotrichum spp. fungal diseases



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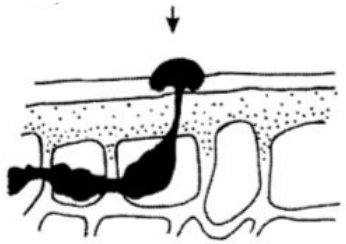
Anthracnose disease cycle

Fruit look perfect and "clean" at harvest

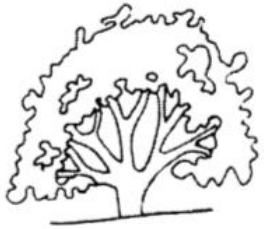
Dormant phase (symptomless)



Fungus resumes growth with fruit ripening, causing rot

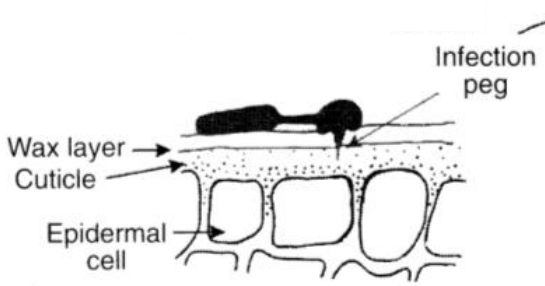
Mass spore production

Spores build up within canopy and mummified fruit



Spores dispersed by wind and rain

When wet, spores germinate and infect peel throughout the season



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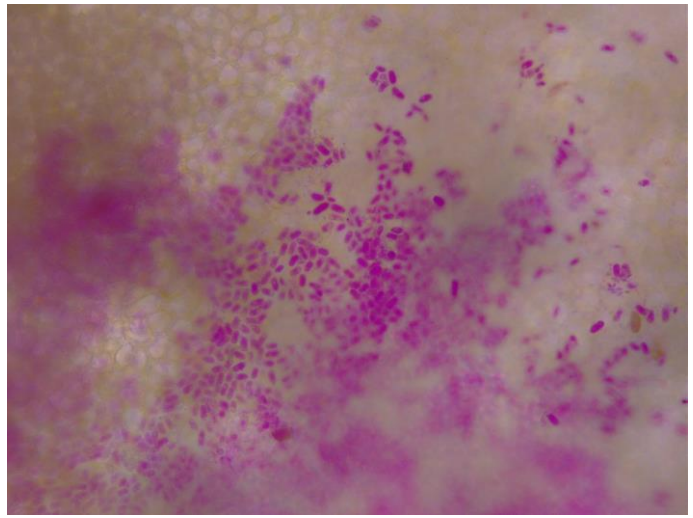
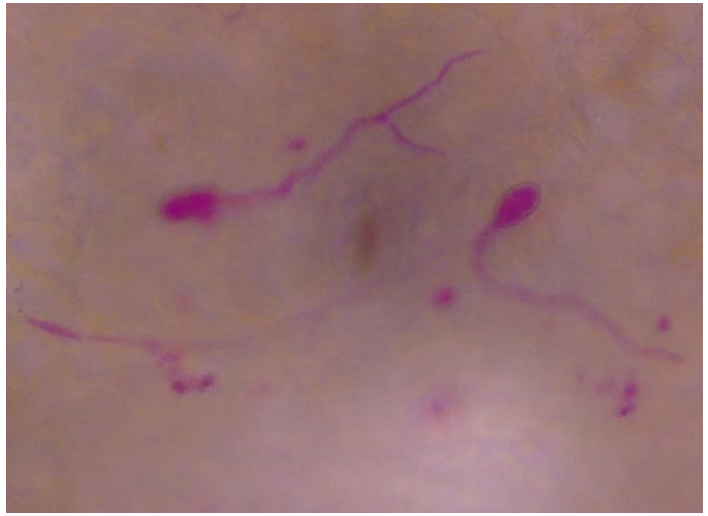
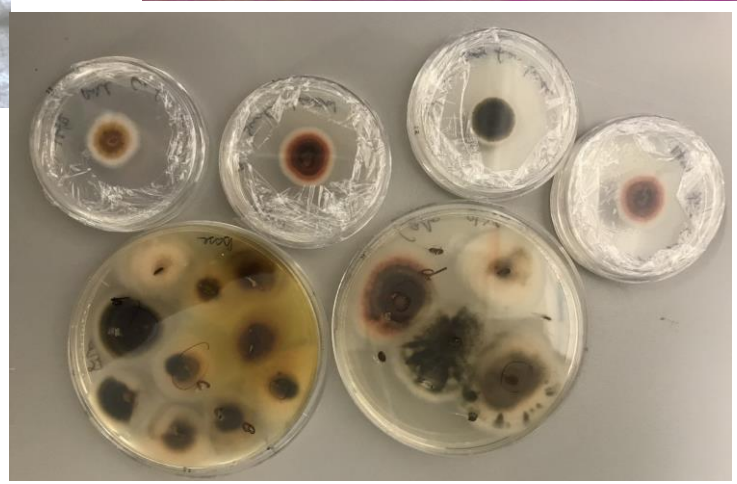
How do I know if my fruit are infected by fungi?

- Pea to olive-sized fruitlets collected early Dec 2020, WA







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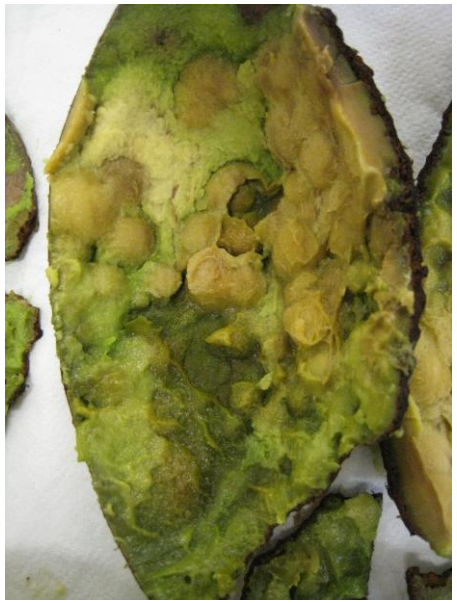
Anthracnose & SER occur worldwide!!

- Some of the causal fungi may differ slightly amongst regions



Ascospores of *Colletotrichum* sp. develop over winter

Waikerie

Spore-laden mummified fruit

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Pepper spot

- Caused by *Colletotrichum spp.*
- Observed on fruit in the orchard
- Often associated with sunburn

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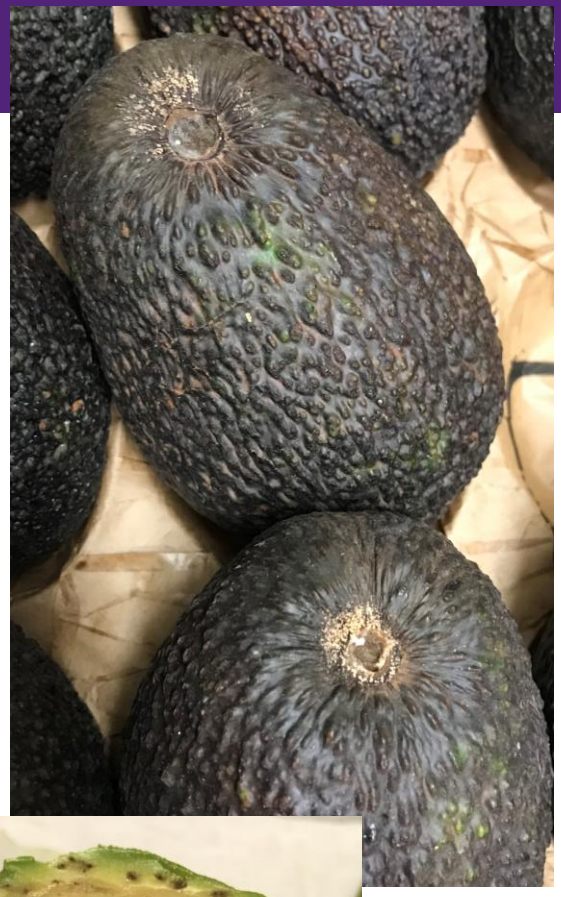
Stem end rot (many fungi)

- *Colletotrichum* spp.
- Botryosphaeriaceae
  - *Neofusicoccum parvum*
  - *Lasiodiplodia theobromae*
- *Neo/pestalotiopsis* sp., *Phomopsis* (*Diaporthe* sp.)
- Endophytic infections occur within stem end, may switch to pathogenic during ripening



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Managing fruit diseases

- Canopy management ***(rejuvenation pruning)*** to allow airflow and good spray coverage
- Orchard hygiene - remove dead branches, dieback limbs, missed fruit
- Avoid stress, sunburn

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Managing fruit diseases

- Thoughtful fungicide spray program
  - ***START EARLY!***
  - Copper formulations, azoxystrobin (e.g. Amistar), Serenade Opti, Luna Sensation
  - Ensure good coverage (spray workshops/video AV19001)
- Correct nutrition (high N, low Ca may exacerbate disease)
- Don't pick fruit in the rain
- Correct postharvest handling and effective fungicide

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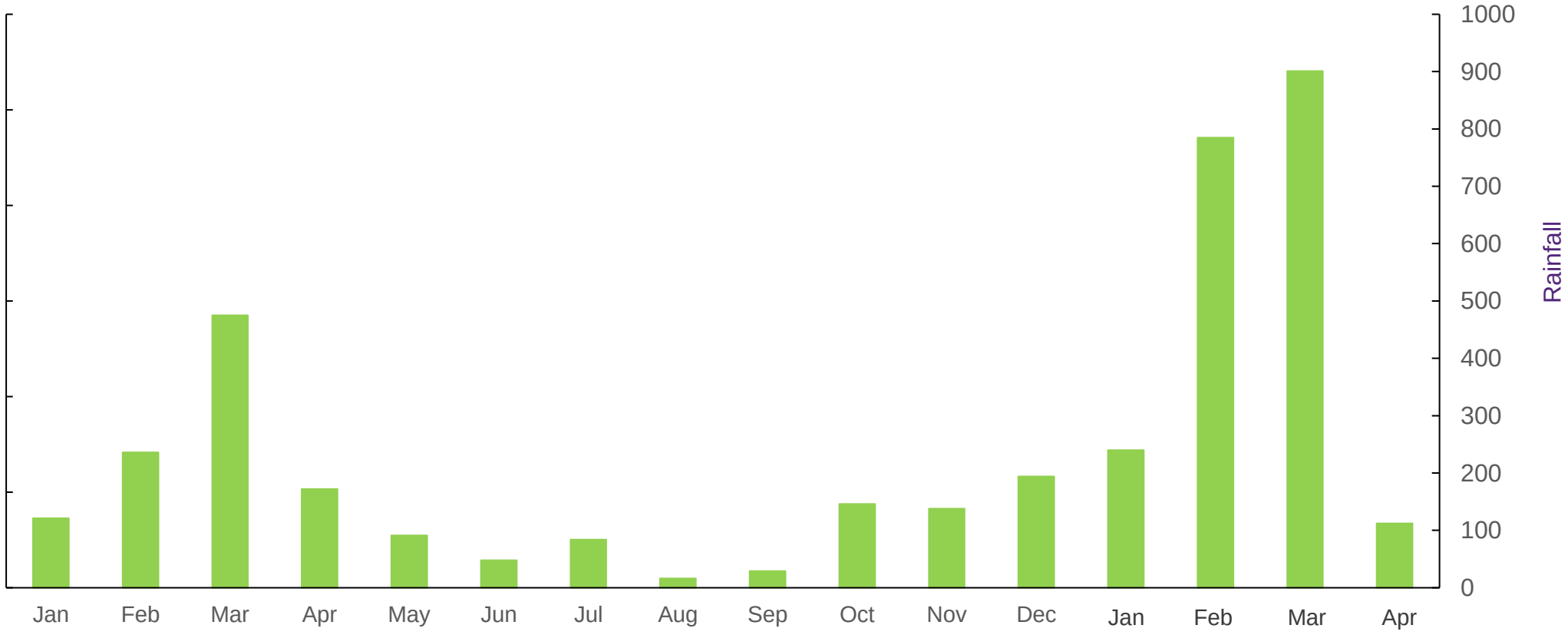
Alstonville rainfall 2021-2022

- Fungicides are essential for quality fruit



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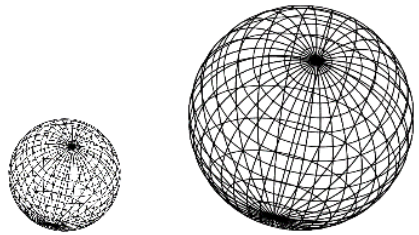
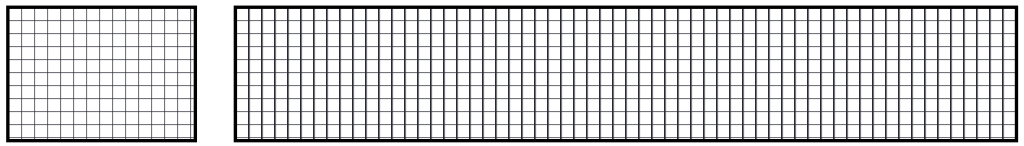
Fungicides

- Protectants (Group M, BM)
  - E.g. Copper formulations, Serenade Opti (microbial extract)
  - Provide a defensive chemical layer on plant surfaces
  - Typically inhibit germinating spores
  - Must be present prior to infection, no post-infection activity
  - Effective against a broad spectrum of fungi
  - Multi-site activity, less chance of resistance
  - Regular applications necessary for thorough coverage
  - Coverage is constantly eroded by weathering and plant (fruit) expansion





NSW Department of Primary Industries primefact

Using copper sprays to control diseases in citrus

April 2017 Primefact 757 second edition
Agriculture NSW

NSW DPI Primefact 757, 2nd ed. (April 2017)

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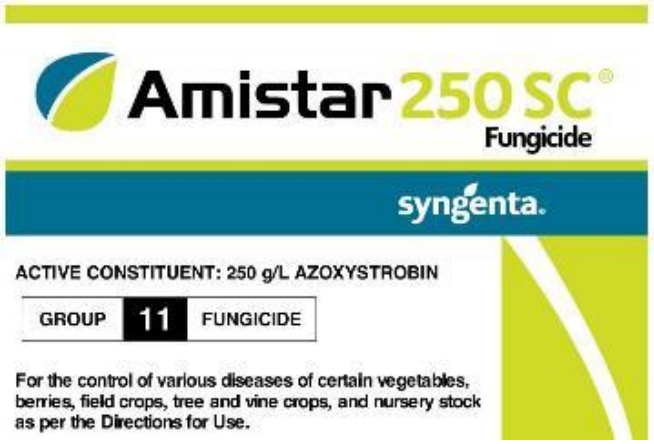
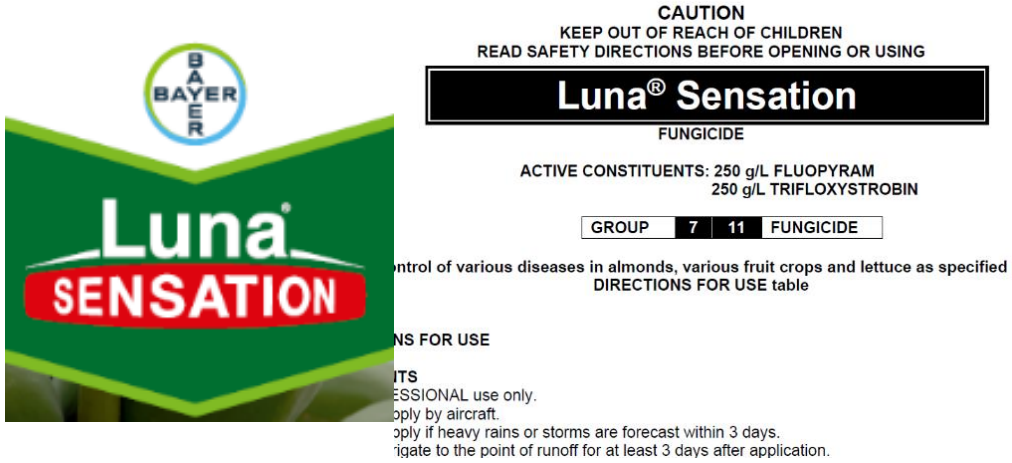
Fungicides

- Amistar (and other strobilurins, Group 11)
  - Systemic, translaminar and protectant properties
  - Good post-infection activity for *Colletotrichum*
  - Inhibits fungal respiration, single site of action
  - Strict anti-resistance strategy for application
  - E.g. no more than 3 applications
  - *follow the label directions !!*

- Luna Sensation (systemic/curative)
  - 2 active ingredients
    - Trifloxystrobin (***same group as azoxystrobin***, Group 11)
    - Fluopyram (Group 7)
  - Protectant, systemic, post-infection activity
  - Strict label directions for max. applications and vol/Ha





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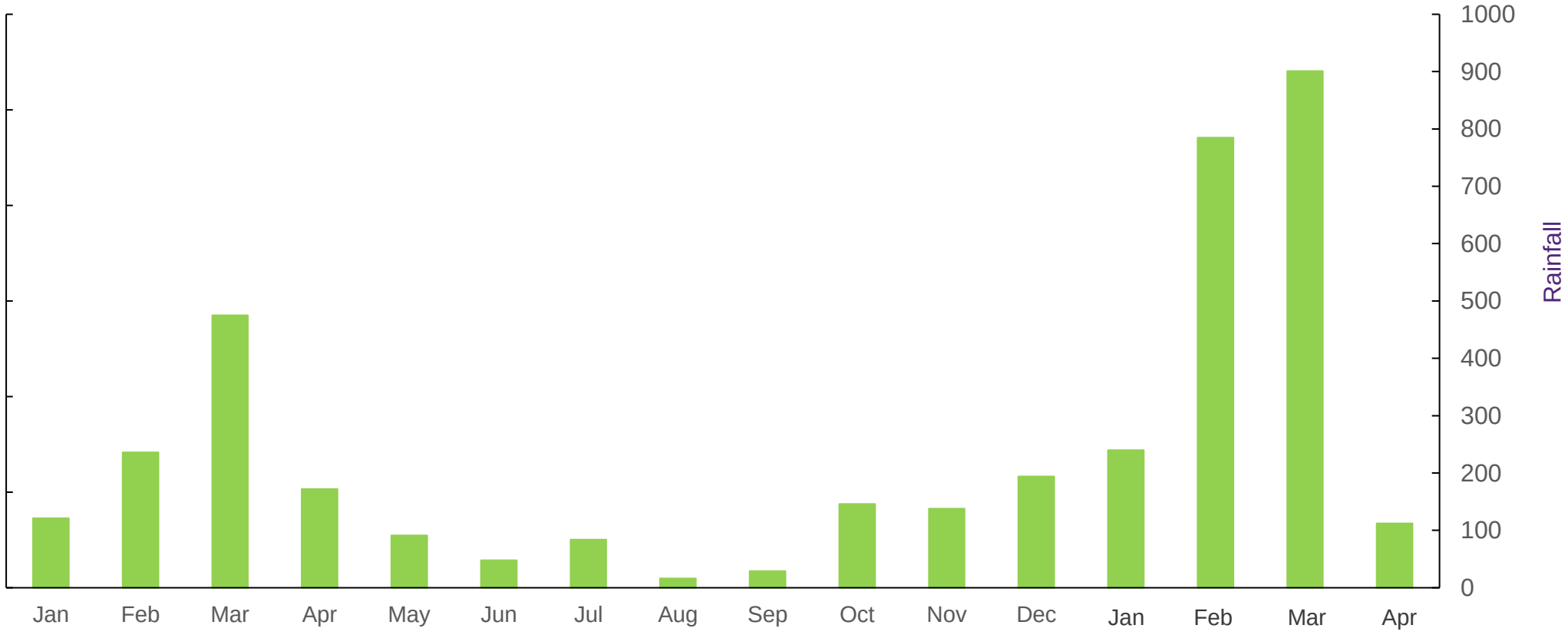
Alstonville rainfall 2021-2022

- Fungicides are essential for quality fruit



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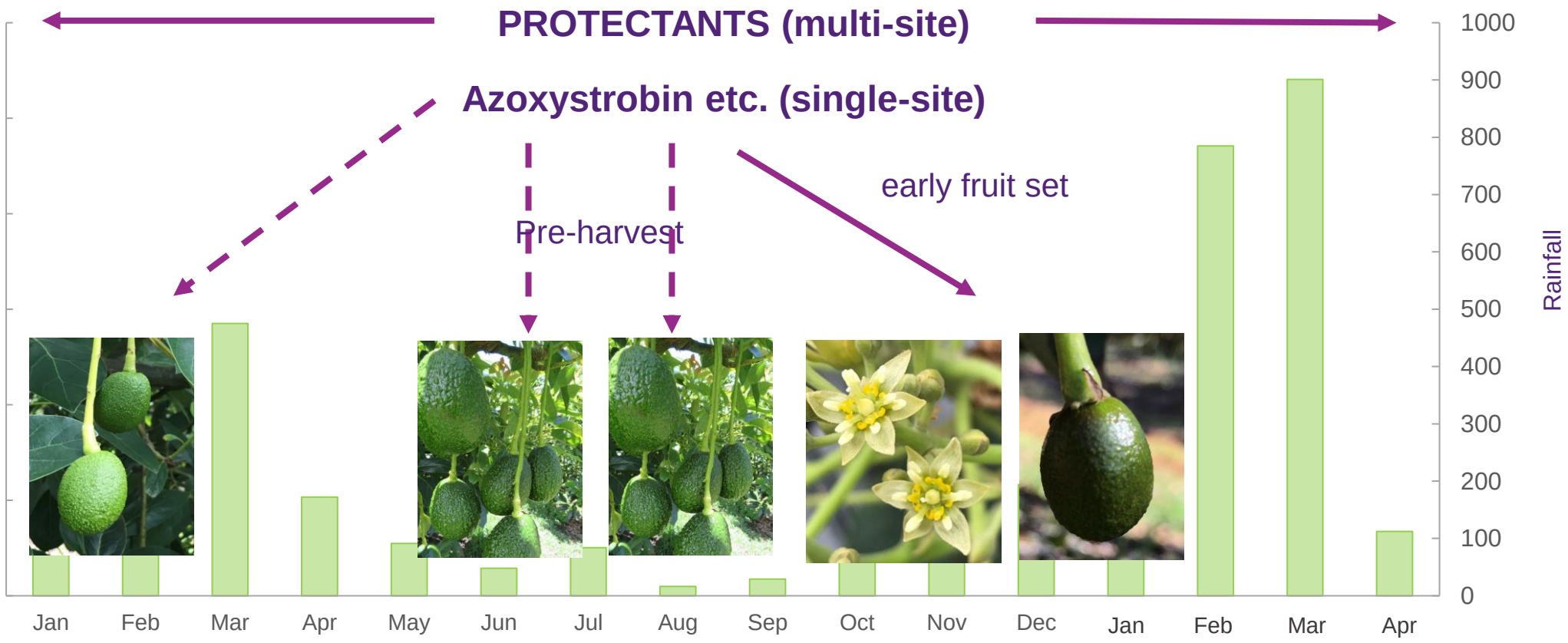
Alstonville fungicide strategy – for discussion

- Modify according to rainfall, time of harvest, destination, etc.



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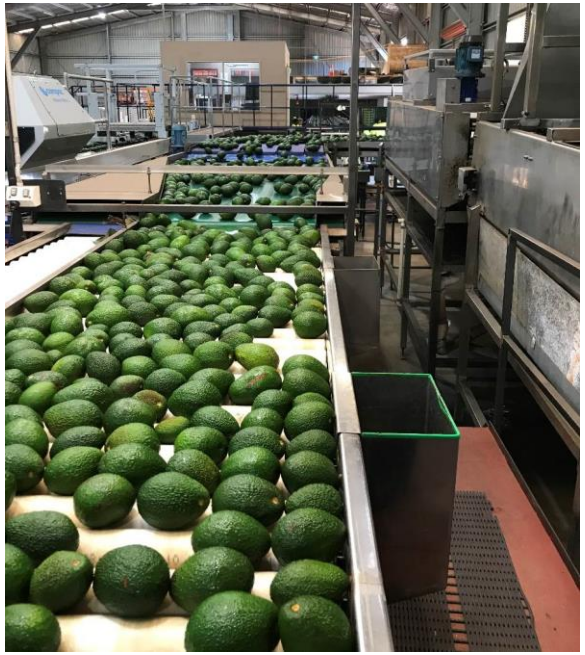
Fungicide use for export fruit

- Recent advice from Syngenta about maximum residue limits (MRLs)

- Azoxystrobin residue <0.01 mg/kg
  - Required for Singapore, Malaysia, Indonesia, UAE
  - 1x Amistar, no later than 56 days before harvest
  - No Graduate A+ postharvest

- Azoxystrobin residue <1.0 mg/kg
  - Required for Hong Kong, Japan, Taiwan
  - 3x Amistar, last application at least 7d prior to harvest
  - No Graduate A+ postharvest



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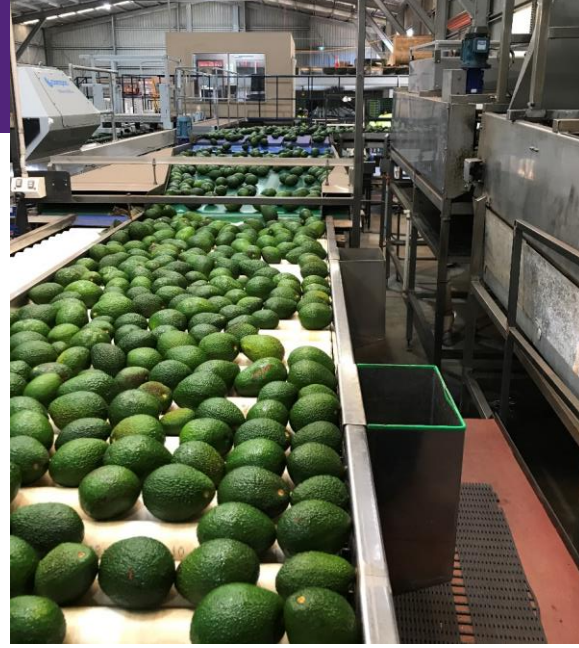

Key messages – anthracnose, SER

- Fruit are infected from early stages but you can't see it
- Canopy management, rejuvenation pruning essential
- Good coverage with fungicides important
- Pre-harvest azoxystrobin fungicide spray crucial
- Post-harvest fungicide also important, but must not be a "Bandaid"
- *Fruit quality is the responsibility of **everyone** along the supply chain!!*

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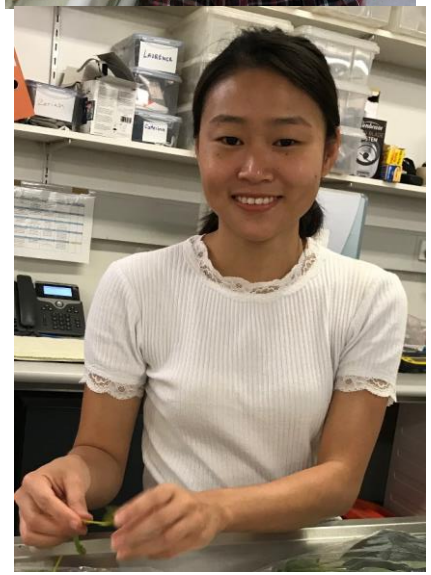
Research update, AV16007













N, Ca and other nutrients (from soil amendment trials)

- N:Ca goal is 20 (pulp) – difficult to achieve (range 29 – 109)
- Sometimes N, Ca, correlates with severity of disease
  - But not always!
- E.g. Costa Childers, QLD
  - % anthracnose & SER was more severe in fruit with increasing pulp N (2019)
- E.g. Bamess Farms, WA
  - % SER was more severe in fruit with increasing pulp N (2019)
  - % SER was more severe in fruit with increasing pulp N:Ca (2021)

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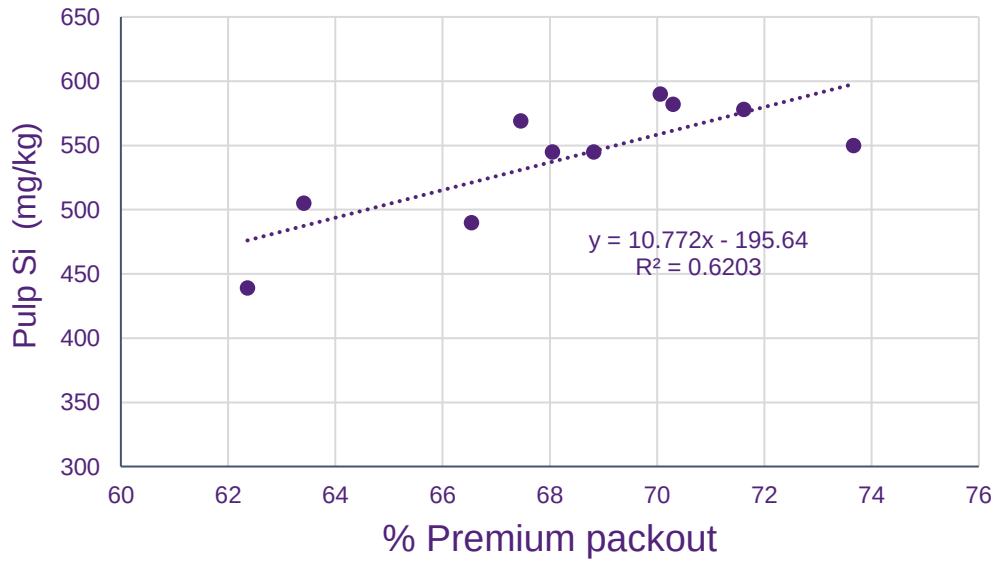
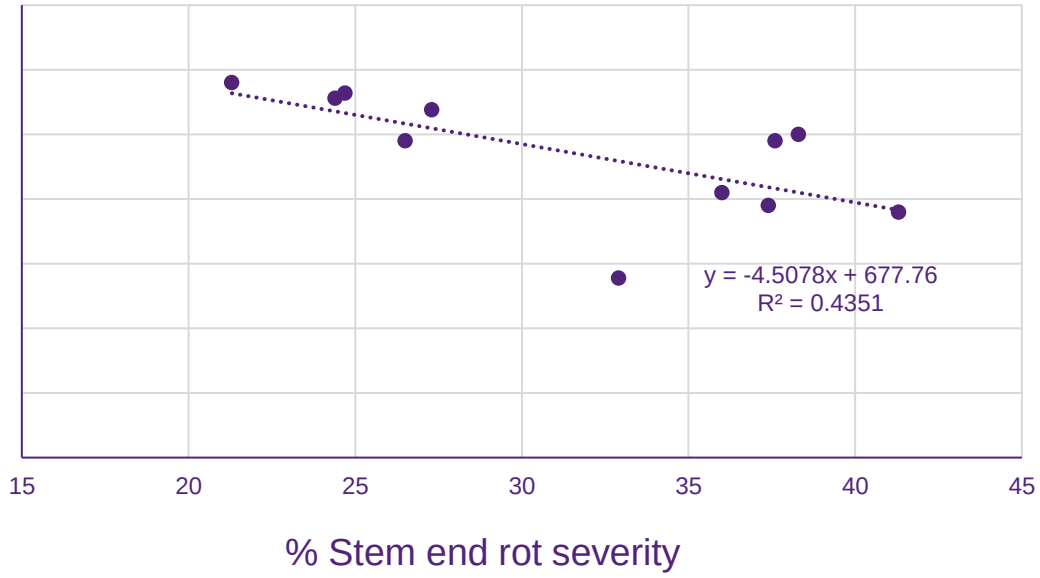
What about silicon?

- Significant (P<0.001) correlations with pulp Si
  - % premium packout (higher packout with increasing Si) e.g. WPA 2019, Costa 2021
  - Severity of stem end rot (lower SER with increasing Si) e.g. Costa 2021

2021 pulp Si vs % Premium packout



2021 pulp Si vs SER



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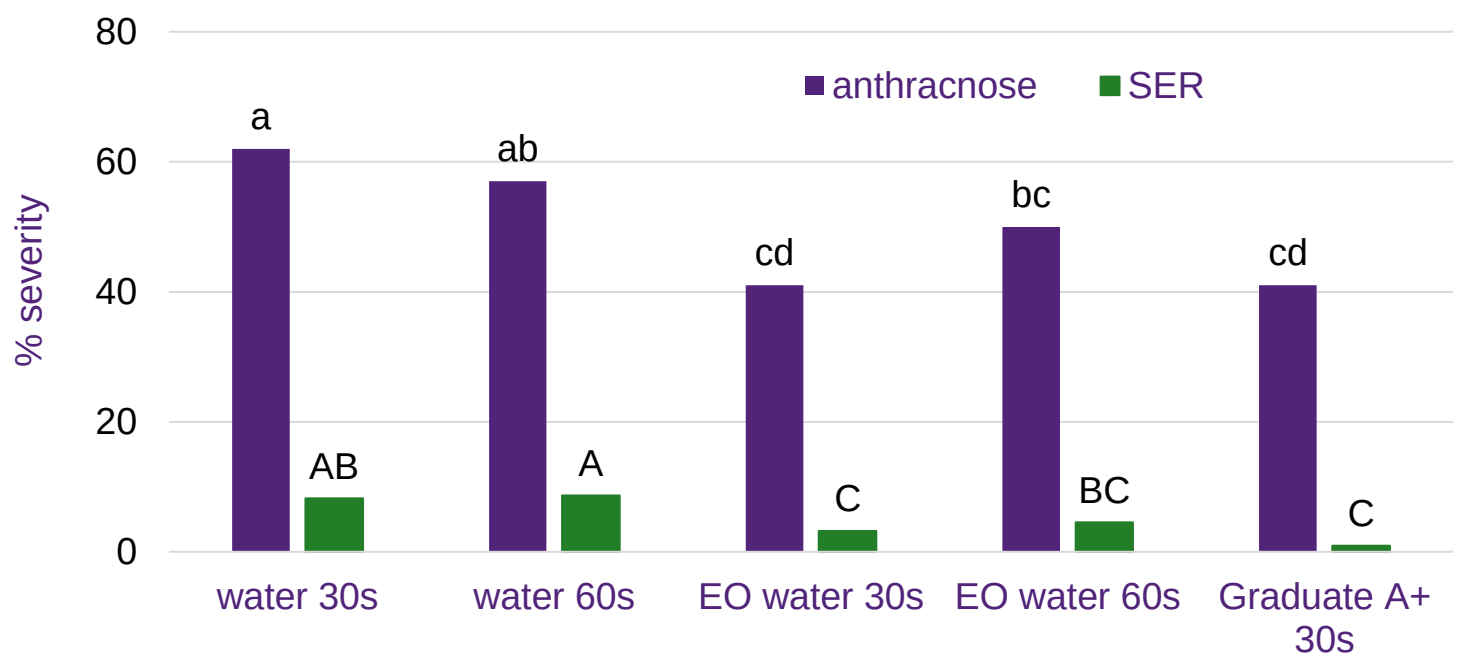
Postharvest treatment – electrolysed oxidising (EO) water



- Hypochlorous acid (sanitiser)
- Used in hospitals, fresh cuts, processing
- Approved input for organic farming

Hassan and Dann, 2019

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Panicle blight/dieback, from late 2019

High frequency of *Colletotrichum* consistently isolated from field tissue in Sept - Oct 2021 (early symptoms)

November 2021

- all over Red Rover ☹

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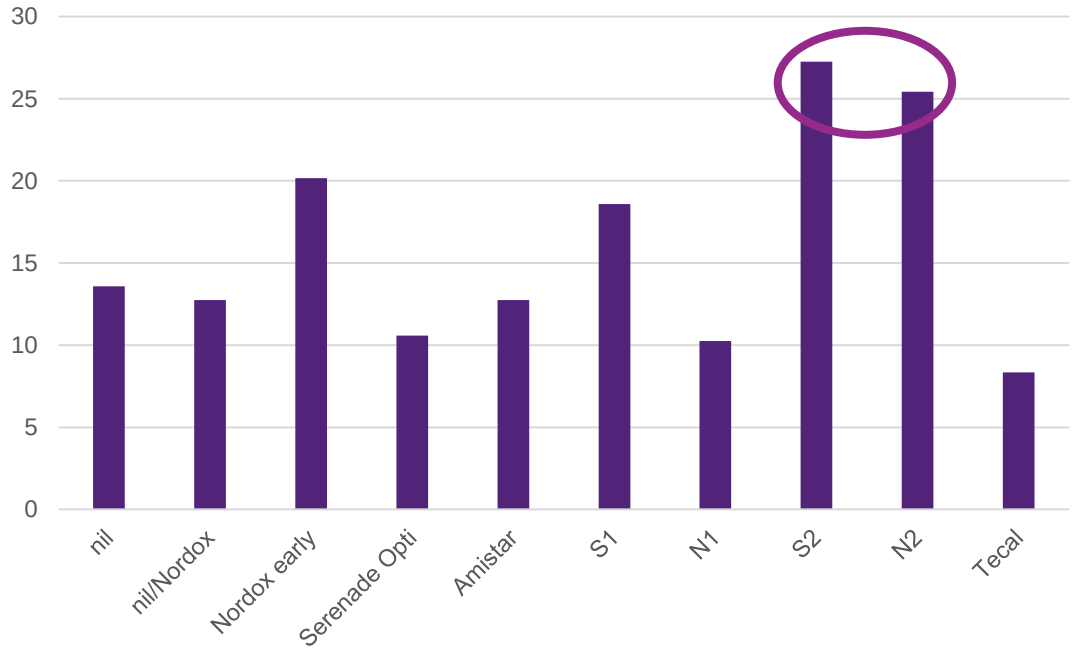
Field trials with promising treatments

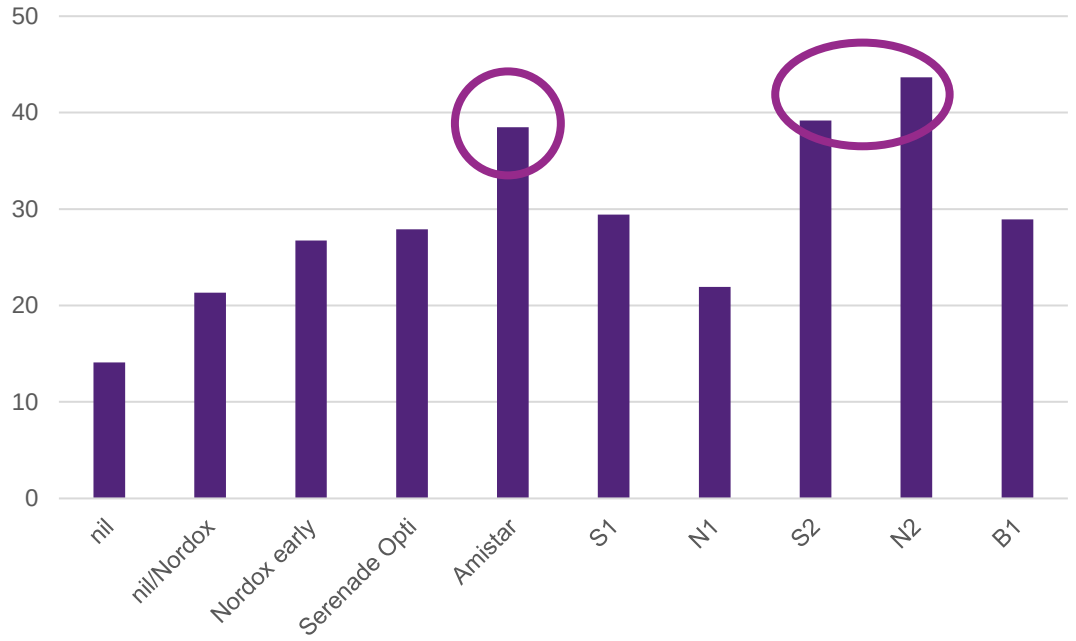
- 2x fungicide sprays during flowering/early fruit set (1x Amistar)
- No phytotoxic effects of fungicides on flowers

Average fruit count per tree, Feb 2021



1st application at 10-20% flowering, 9 September 2020
2nd application at 50-60% flowering, 22 September 2020

Average fruit count per tree, Jan 2022



1st application at 40-50% flowering, 15 September 2021
2nd application early fruit set (fruitlets ~ 12mm diam), 28 Oct 2021

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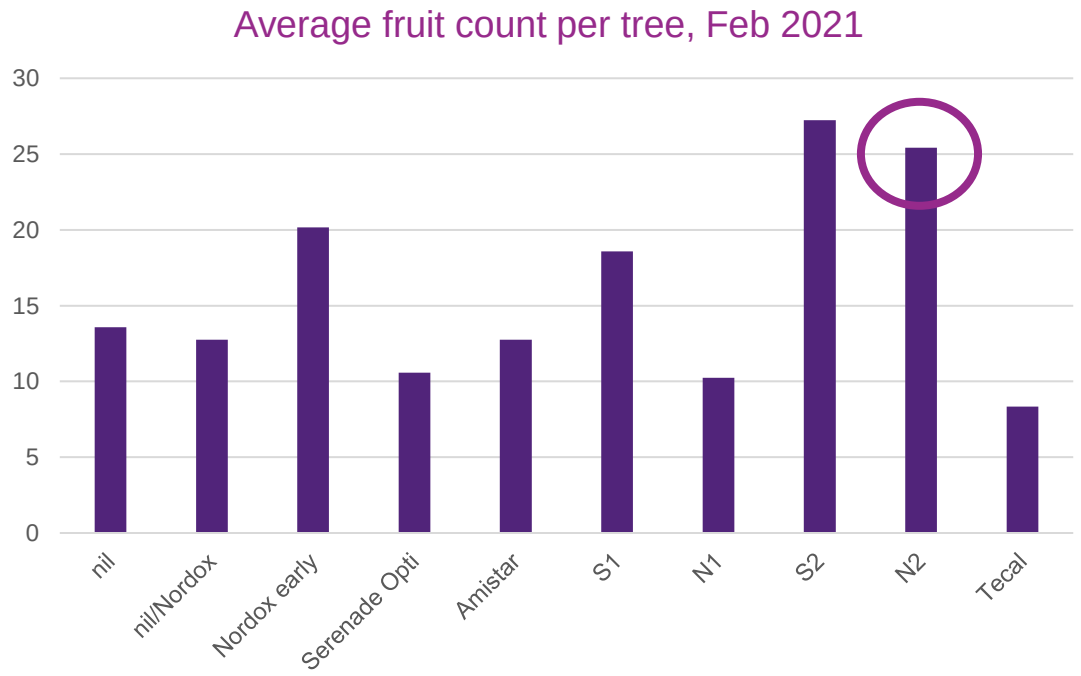
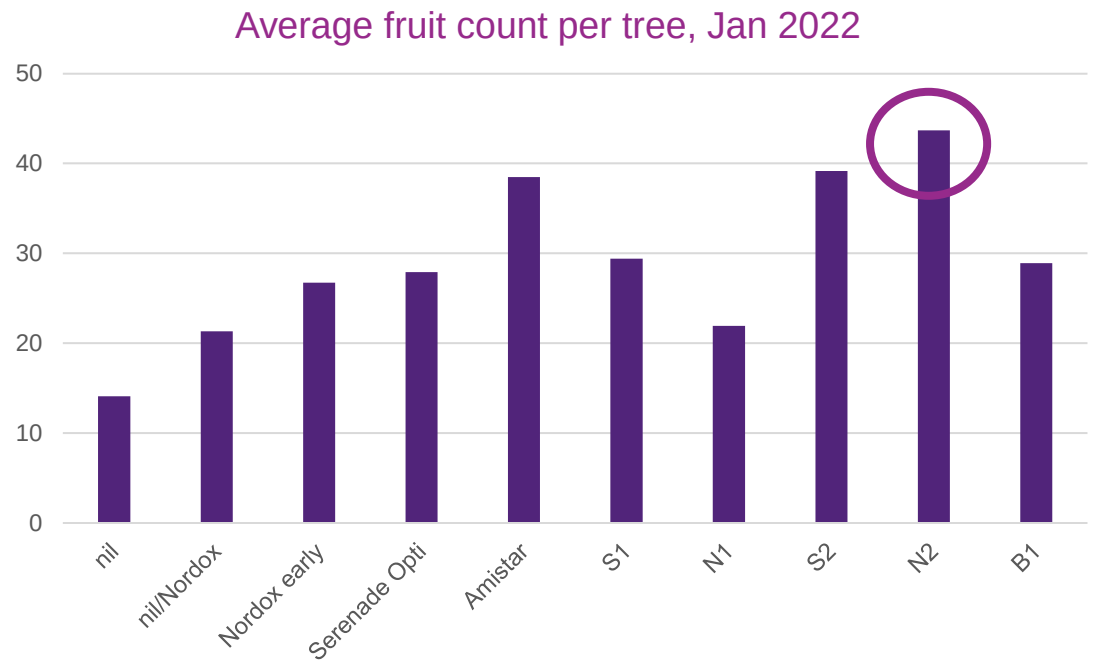
Nufarm looking to extend label for “N2” to include avos

- New mode of action, preventative, protectant
- Low toxicology, negligible residues, MRL (Australia) not necessary
- Further trials, including large scale field trials





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Panicle dieback – can we prune it out?

Yes! I think so!!

Prune after harvest, not in summer, to reduce vigorous regrowth

May 2022 Av 5.0 kg/tree

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Acknowledgements

- Avocado pathology team
- Growers, agronomists, packsheds, nursery collaborators
- AV16007 & AV19005 are jointly supported by Queensland DAF and UQ

- Contact e.dann@uq.edu.au