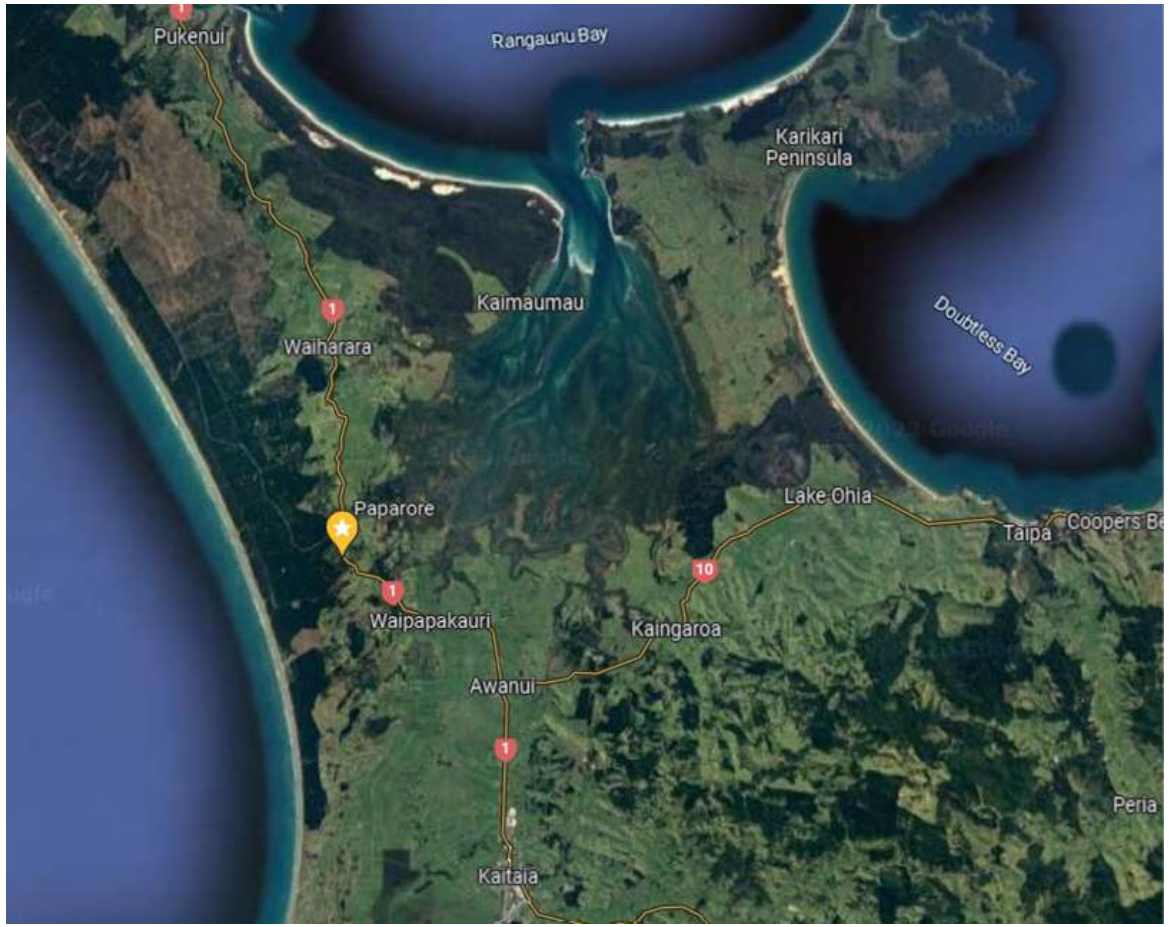
High-Density (HD) Avocado Production in New Zealand

Experiences at VALIC King Avocado Orchard

by

Claudia Hermosilla (Orchard Manager)
Anthony W. Whiley (Consultant Agronomist)

VALIC NEW ZEALAND Ltd



Location & Description

- King Avocados is in the Far North region of NZ
- It's sited between the Tasman Sea & Rangaunu Harbour (Pacific Ocean) – a high wind zone.
- 1200 mm annual rainfall (distributed throughout the year)

Location & Description

- King Avocados is in the Far North region of NZ
- It's sited between the Tasman Sea & Rangaunu Harbour (Pacific Ocean) – a high wind zone.
- 1200 mm annual rainfall (distributed throughout the year

- Orchard has flat to rolling topography

Location & Description

- King Avocados is in the Far North region of NZ
- It's sited between the Tasman Sea & Rangaunu Harbour (Pacific Ocean) – a high wind zone.
- 1200 mm annual rainfall (distributed throughout the year)
- Orchard has flat to rolling topography

- Soils are mostly sandy, but there are areas where sand overlays peat

Location & Description

- King Avocados is in the Far North region of NZ
- It's sited between the Tasman Sea & Rangaunu Harbour (Pacific Ocean) – a high wind zone.
- 1200 mm annual rainfall (distributed throughout the year)
- Orchard has flat to rolling topography
- Soils are mostly sandy, but there are areas where sand overlays peat

- Trees are Hass grafted to either seedling Zutano or clonal Dusa rootstocks

Location & Description

- King Avocados is in the Far North region of NZ
- It's sited between the Tasman Sea & Rangaunu Harbour (Pacific Ocean) – a high wind zone.
- 1200 mm annual rainfall (distributed throughout the year)
- Orchard has flat to rolling topography but
- Soils are mostly sandy, but there are areas where sand overlays peat
- Trees are Hass grafted to either seedling Zutano or clonal Dusa rootstocks

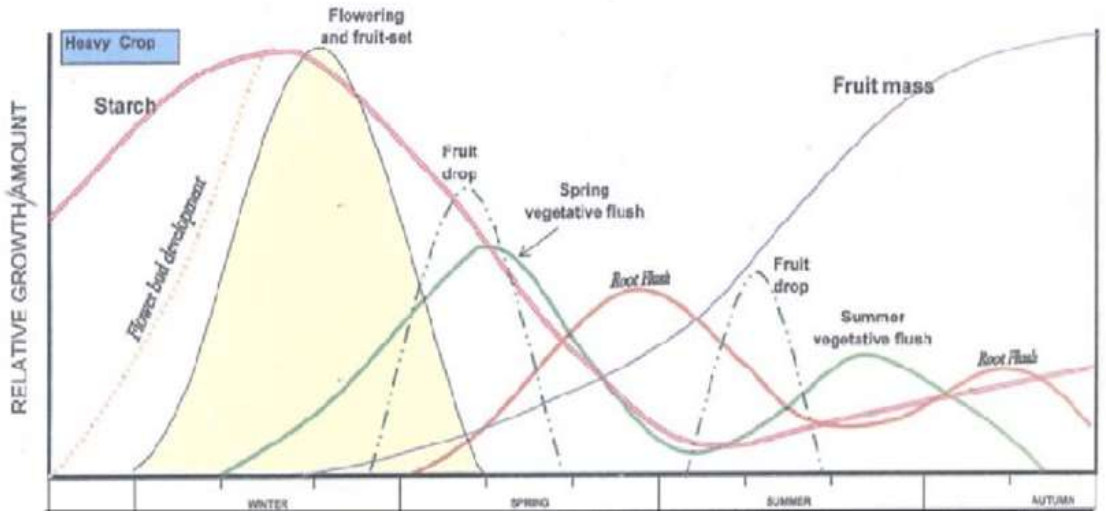
- Trees are planted at densities between 660 to 1600 trees/ha

Objectives

Our Motto is “On time Every time”

- Lift whole of orchard production to 18+ t/ha

Objectives



- Lift whole of orchard production to 18+ t/ha
- Remain attuned to tree phenology/physiology

Objectives

- Lift whole of orchard production to 18+ t/ha
- Remain attuned to tree phenology/physiology
- Develop sustainable management practices.

Objectives

- Lift whole of orchard production to 18+ t/ha
- Remain attuned to tree phenology/physiology
- Develop sustainable management practices

- Maintain tree height at 2-3 m depending on planting density

Objectives

- Lift whole of orchard production to 18+ t/ha
- Remain attuned to tree phenology/physiology.
- Develop sustainable management practices.
- Maintain tree height at 2-3 m depending on planting density

- Produce export quality fruit that can perform in all markets

Objectives

- Lift whole of orchard production to 18+ t/ha
- Remain attuned to tree phenology/physiology.
- Develop sustainable management practices.
- Maintain tree height at 2-3 m depending on planting density
- Produce export quality fruit that can perform in all markets

- Provide commensurate return on investment for owners

Management Strategies

- Set medium to heavy crop loads every year.

Management Strategies

- Setting medium to heavy crop loads every year:
  - Honey bee hives at 10/ha during flowering

Management Strategies

- Setting medium to heavy crop loads every year.
  - Honey bee hives at 10/ha are used during the flowering
  - 4% of pollinisers in blocks planted before 2015 increased to 11% in later planted blocks

Management Strategies

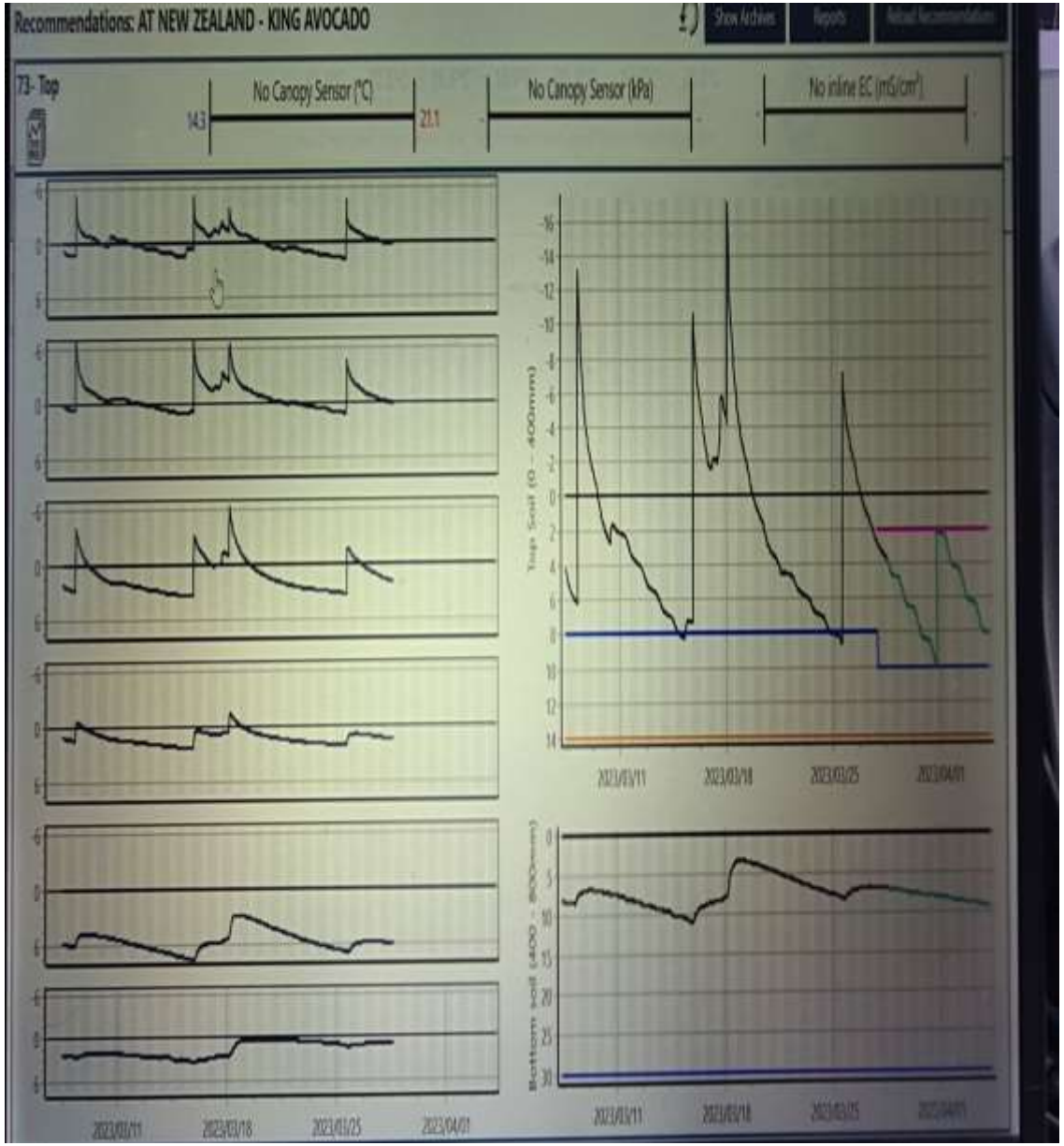
- Setting medium to heavy crop loads every year:
  - Honey bee hives at 10/ha during flowering
  - 4% of pollinisers in blocks planted before 2015 increased to 11% in later planted blocks

- Balanced nutrition program that assists in fruit retention and produces export quality fruit with N/Ca ratios in fruit flesh less than 20

Management Strategies

- Balanced nutrition program that assists in fruit retention and produces export quality fruit N/Ca ratios in fruit flesh less than 20

- Nutrients are applied by fertigation and helicopter with pesticide application by helicopter



Management Strategies

- Balanced nutrition program that assists in fruit retention and produces export quality fruit N/Ca ratios in fruit flesh less than 20
- Nutrients are applied by fertigation and helicopter with pesticide application by helicopter

- The orchard maintained free of water stress

Management Strategies

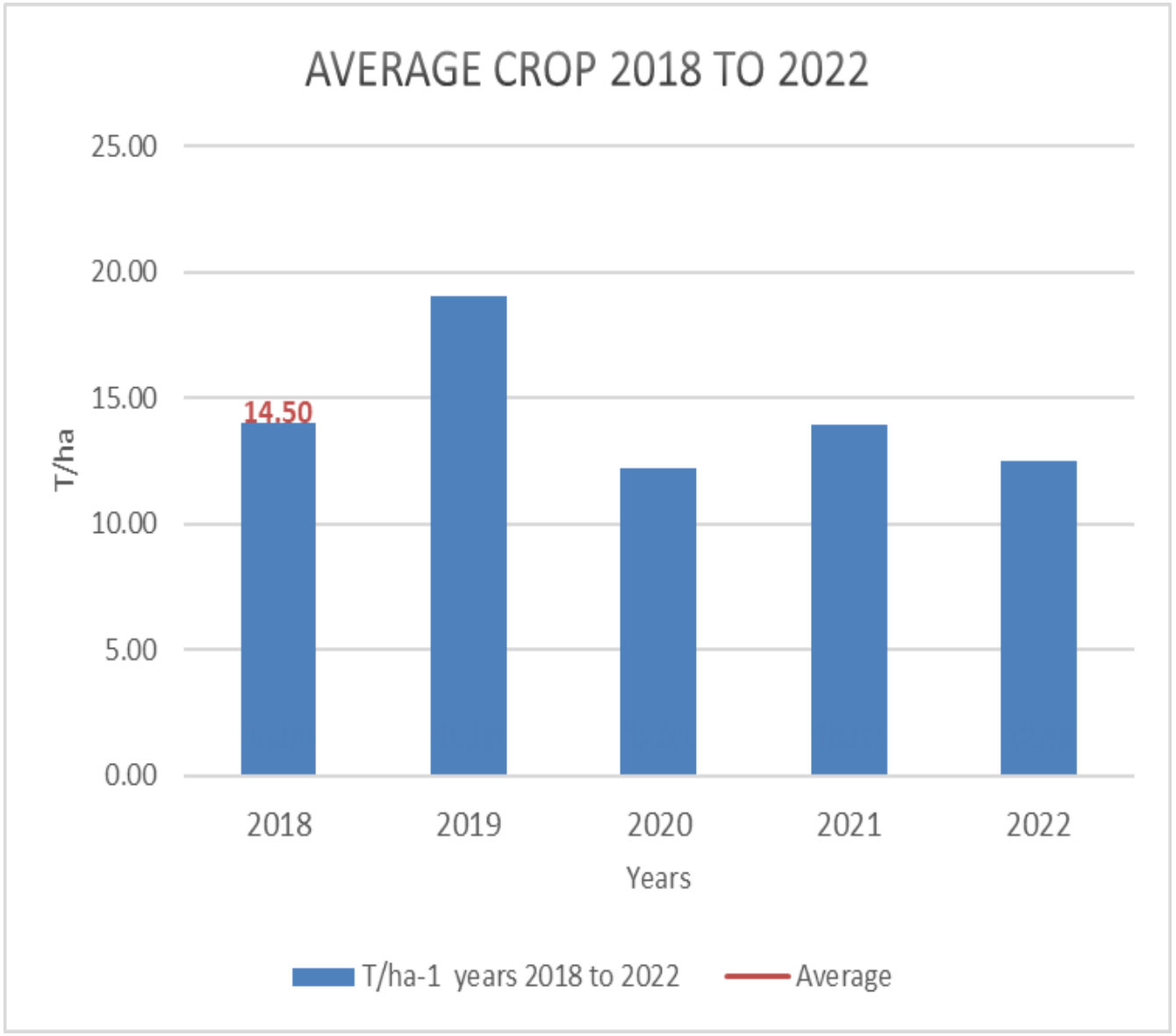
- Balanced nutrition program that assists in fruit retention and produces export quality fruit N/Ca ratios in fruit flesh less than 20
- Nutrients are applied by fertigation and helicopter with pesticide application by helicopter
- The orchard maintained free of water stress

- Strategic applications of PGR (Triazoles)
  - Uniconazole used as mid-bloom foliar
  - Paclobutrazol used as soil application

Management Strategies

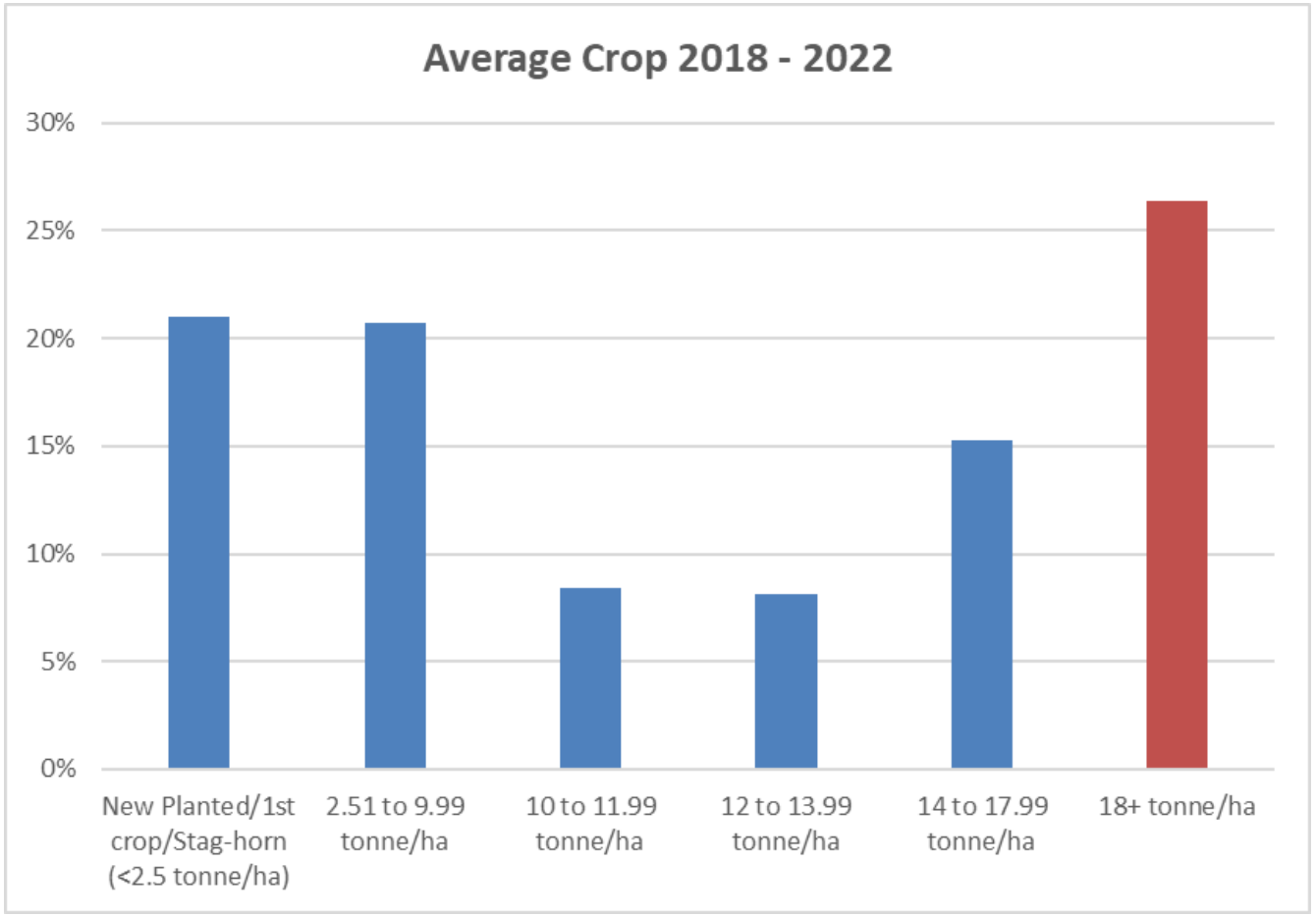
- Balanced nutrition program that assists in fruit retention and produces export quality fruit N/Ca ratios in fruit flesh less than 20
- Nutrients are applied by fertigation and helicopter with pesticide application by helicopter
- The orchard maintained free of water stress
- Strategic applications of PGR (Triazoles)
  - Uniconazole used as mid-bloom foliar
  - Paclobutrazol used as soil application

- Strategic pruning to control tree height and maintain light penetration



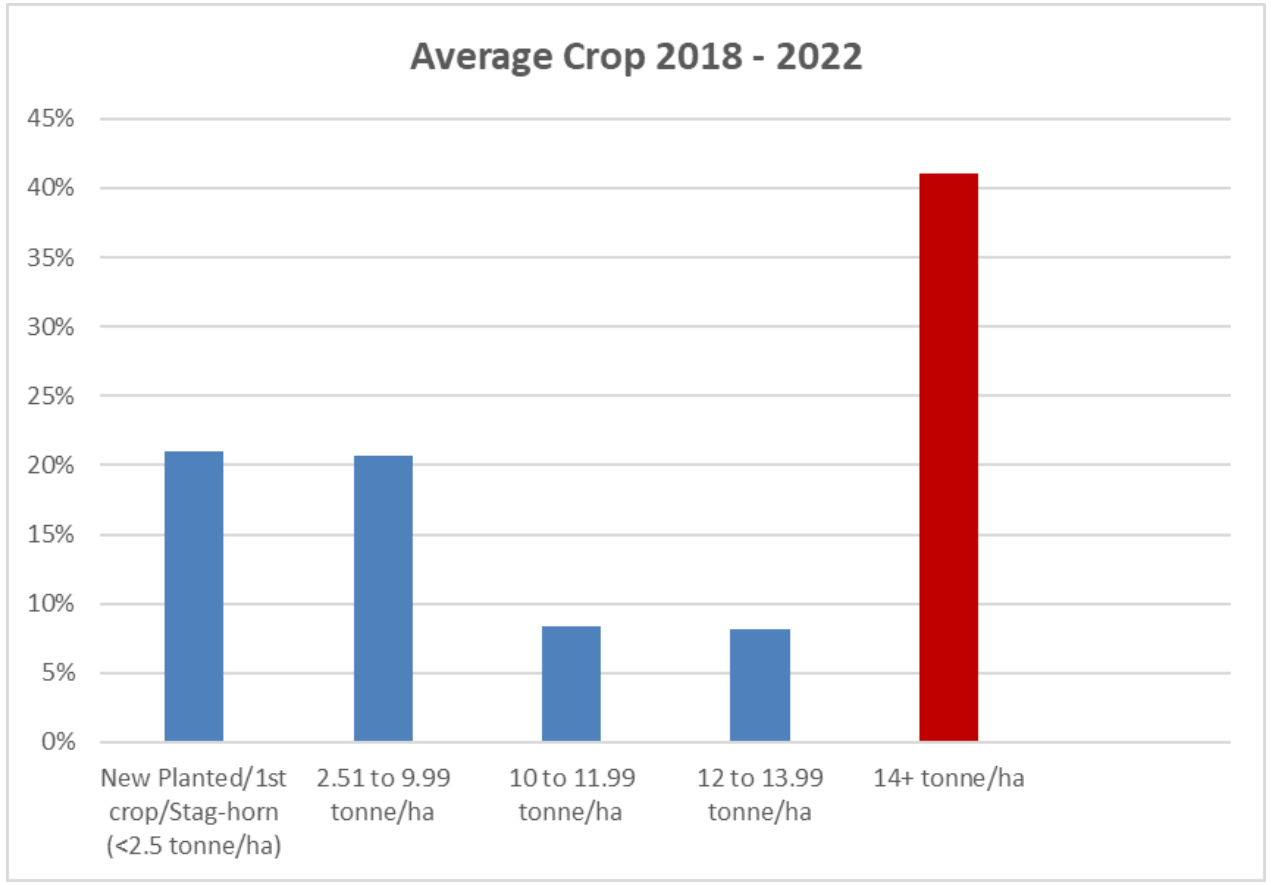
Orchard Performance

- Average across farm yield from King Avocados over the past 5 years is 14.5 t/ha



Orchard Performance

- Average across farm yield from King Avocados over the past 5 years is 14.5 t/ha
- 26% of the orchard averaged 18+ t/ha over the past 5 years



Orchard Performance

- Average across farm yield from King Avocados over the past 5 years is 14.5 t/ha
- 26% of the orchard averaged 18+ t/ha over the past 5 years

- 41% of the orchard averaged 14+ t/ha over the past 5 years

Orchard Performance

- Average across farm yield from King Avocados over the past 5 years is 14.5 t/ha
- 26% of the orchard averaged 18+ t/ha over the past 5 years
- 41% of the orchard averaged 14+ t/ha over the past 5 years

- Best block yield for a single year was 43 t/ha

Orchard Performance

- Average across farm yield from King Avocados over the past 5 years is 14.5 t/ha
- 26% of the orchard averaged 18+ t/ha over the past 5 years
- 41% of the orchard averaged 14+ t/ha over the past 5 years
- Highest block yield for a single year is 43 t/ha

- Variability in yield between blocks across the farm is due to:
  - Different stages of canopy development

Orchard Performance

- Average across farm yield from King Avocados over the past 5 years is 14.5 t/ha
- 26% of the orchard averaged 18+ t/ha over the past 5 years
- Best block yield for a single year is 43 t/ha
- Variability in yield between blocks across the farm is due to:
  - Different stages of canopy development
  - Drainage issues blocks with under-lying peat

Orchard Performance

- Average across farm yield from King Avocados over the past 5 years is 14.5 t/ha
- 26% of the orchard averaged 18+ t/ha over the past 5 years
- Highest block yield for a single year is 43 t/ha
- Variability in yield between blocks across the farm is due to:
  - Different stages of canopy development
  - Drainage issues blocks with under-lying peat.
  - Periodic cold damage in frost-prone blocks

Advantages of HD Orchards

- Easy access to fruit brings lower harvest costs

Advantages of HD Orchards

- Easy access to fruit brings lower harvest costs
- Minimises wind and mechanical damage to fruit

Advantages of HD Orchards

- Easy access to fruit brings lower harvest costs
- Minimises wind and mechanical damage to fruit

- Greater flexibility with harvest operations in responding quickly to weather events

Advantages of HD Orchards

- Easy access to fruit brings lower harvest costs
- Minimises wind and mechanical damage to fruit
- Greater flexibility with harvest operations in responding quickly to weather events

- Happy workers who keep their feet on the ground

Challenges of HD Orchards

- Strong winds (SW) at site:
  - Shelter belts 8+ m high
  - Light and root competition

Challenges of HD Orchards

- Strong winds (SW) at site:
  - Shelter belts 8+ m high
  - Light and root competition

- High rainfall & relative humidity promote:
  - Strong vegetative growth
  - Short periods of quiescence

Challenges of HD Orchards

- Strong winds (SW) at site:
  - Shelter belts 8+ m high
  - Light and root competition
- High rainfall & relative humidity promote:
  - Strong vegetative growth
  - Short periods of quiescence

- Without effective canopy management HD orchards become “feral”

Challenges of HD Orchards

- Strong winds (SW) at site:
  - Shelter belts 8+ m high
  - Light and root competition
- High rainfall & relative humidity promote:
  - Strong vegetative growth
  - Short periods of quiescence
- Without effective canopy management HD orchards become “feral”

- Results in a loss of production in lower tree zone
  - Slow harvest (high cost)
  - Increased cosmetic fruit damage

Revival of “Feral" Orchards

- Annual selective limb removal plus cincturing of remaining limbs DID NOT WORK

Revival of Feral Orchards

- Annual selective limb removal plus cincturing of remaining limbs DID NOT WORK
- Removing the tree centre to increase light interception DID NOT WORK

Revival of Feral Orchards

- Annual selective limb removal plus cincturing of remaining limbs DID NOT WORK
- Removing the tree centre to increase light interception DID NOT WORK

- Stag-horn pruning in spring is showing some promise – “work in progress”

Revival of Feral Orchards

- Annual selective limb removal plus cincturing of remaining limbs DID NOT WORK
- Removing the tree centre to increase light interception DID NOT WORK
- Stag-horn pruning in spring is showing some promise

- Regrowth management
  - Selective branch removal (autumn)
  - Selective pruning after harvest
  - Outside canopy row maintained at 2 or 4 m high (depending on density)

Conclusions

- We are having successes and failures in managing HD orchards

Conclusions

- We are having successes and failures in managing HD orchards
- We have shown that HD orchards can be extremely productive at our site

Conclusions

- We are having successes and failures in managing HD orchards
- We have shown that HD orchards can be extremely productive at our site

- Failures relate to trees eventually passing a height threshold ("feral" orchards)

Conclusions

- We are having successes and failures in managing HD orchards
- We have shown that HD orchards can be extremely productive at our site
- Failures relate to trees eventually passing a height threshold (“feral” orchards)

- Current on-farm research is giving promising results in orchard rehabilitation but we are still learning

Dr Tony Whiley was appointed as a consultant agronomist in 2010

Ongoing projects/trials:

- Field grafting redundant Reed blocks to Hass
- Field grafting Hass onto Zutano seedlings where seeds were sown directly in-situ
- PGR treatments on stag-horned trees – no conclusive data
- Cincturing/Girdling with PGR treatments on stag-horned trees – starting in March 2023
- Assessment of the Bumble bee as an effective pollinator

Thank You for Your Attention