



Beyond AvoGreen®

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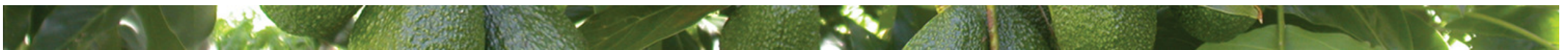
What is AvoGreen[®]?

- AvoGreen[®] is an IPM system
- Sprays applied in response to monitored pest pressure
- Response thresholds for each pest
- Provides basis for justifying use of pesticides
- Saves costs by reducing unnecessary sprays and adds value by increasing packouts
- Why the need for change?

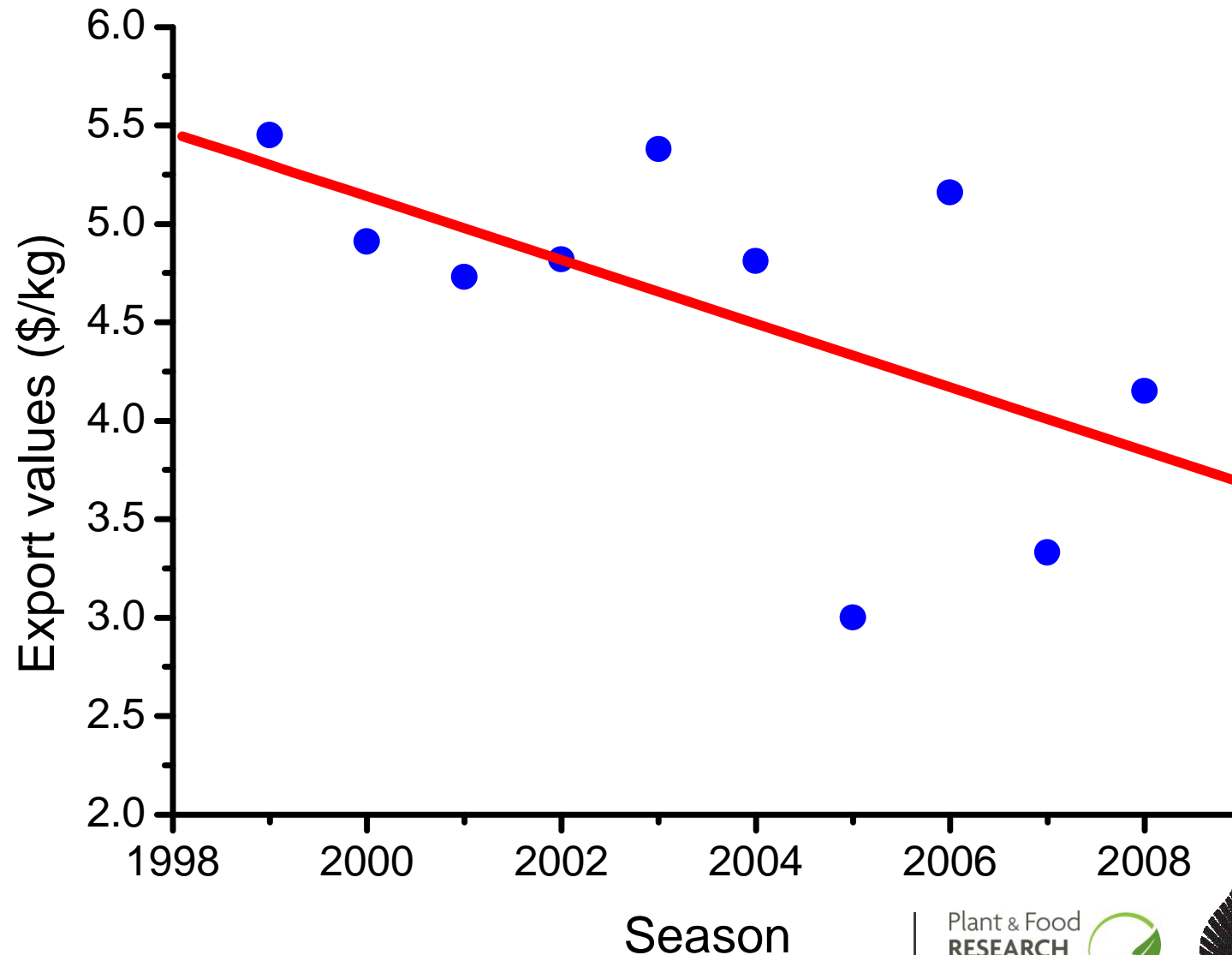
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Why the need for change?



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Where are we headed?

Forecast strong growth in volumes

→ Develop new markets – target niche/premier markets for higher returns

→ Produce fruit with all market access

Consistent, high **QUALITY** is a **necessity** for entry to premier markets

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What is Quality?

Traditionally

→ Grade

Freedom from rots

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What is Quality?

In future

- Grade
- Freedom from rots
- Safety**
- Taste**
- Healthy**
- Sustainability**



What lies beyond?

Regulatory Drivers:

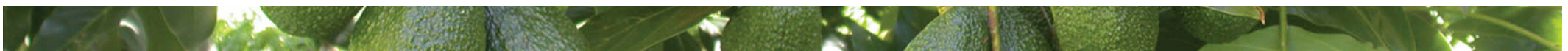
- ERMA, HASNO, Emissions Trading, Regional Councils

Customer Drivers:

- Food miles, carbon labels, supply programmes e.g. GlobalGAP, Walmart Sustainability Index

➡ **GAP = Good Agricultural Practice**

- Need to look at all aspects of production systems including SUSTAINABILITY



Plugging the GAP

Good Agricultural practice

- AvoGreen[®] provides a strong platform to build on
- Increased emphasis on justifying use /reduce pesticide inputs where required
- Major issue for avocados in New Zealand is copper use



Copper – a dilemma

- Heavily reliant on regular copper fungicides to control rots = major quality problem.
- Why copper?
 - Cheap
 - Effective
 - No market access issues
- But.....

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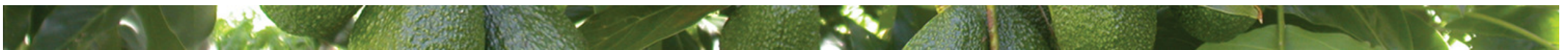


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Copper - a dilemma

- Copper is a heavy metal.
- Ecotoxic in soluble form.
- Readily binds to clay particles and organic matter:
 - Forms insoluble complexes that are tightly bound to soil and very stable
→ accumulates in soil over time.



Objectives

- Establish baseline soil copper levels in avocado orchards
- Investigate alternatives to copper for rot control



Soil Survey Procedure

- 203 soil samples collected from 165 orchards.
- Sampled range of different tree ages.
- Measured Total and Extractable copper.
- Obtained information on:
 - Land use history
 - Historical copper fungicide use
 - Tree age.

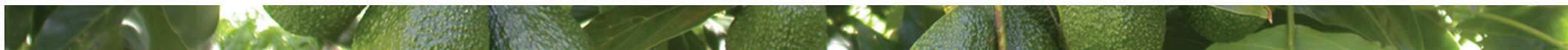
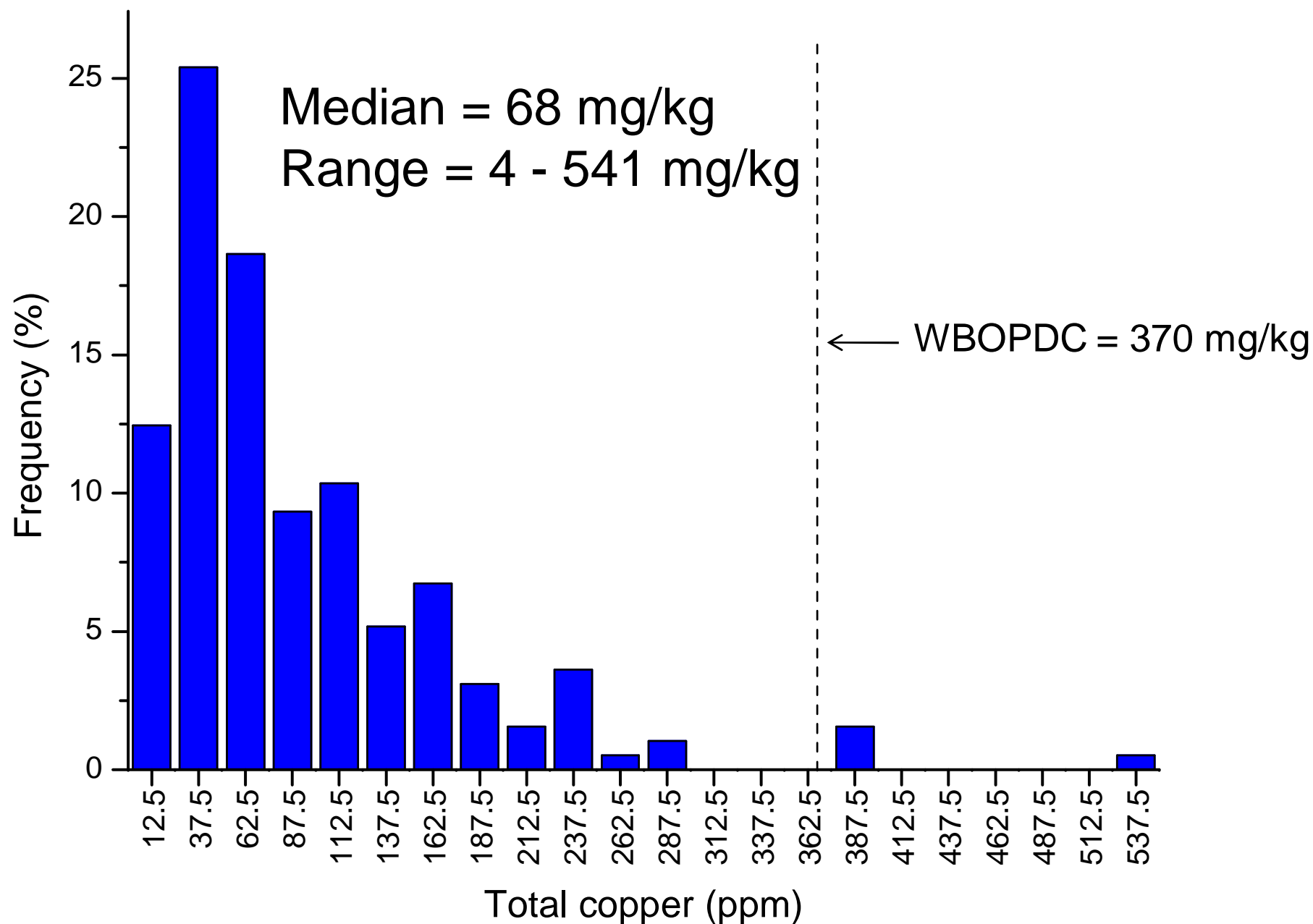
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Frequency distribution of total soil copper



Previous surveys

NZ wide 1999 - 19 orchards:

mean 170 mg/kg
range 70 – 480 mg/kg

Holland and Solomona (1999)

Auckland 2002 - 43 orchards:

mean 209 mg/kg
range 7 - 490 mg/kg

Gaw (2002)

Australia 2002 (NSW avocados):

range 280 - 340 mg/kg

Merrington et al (2002)

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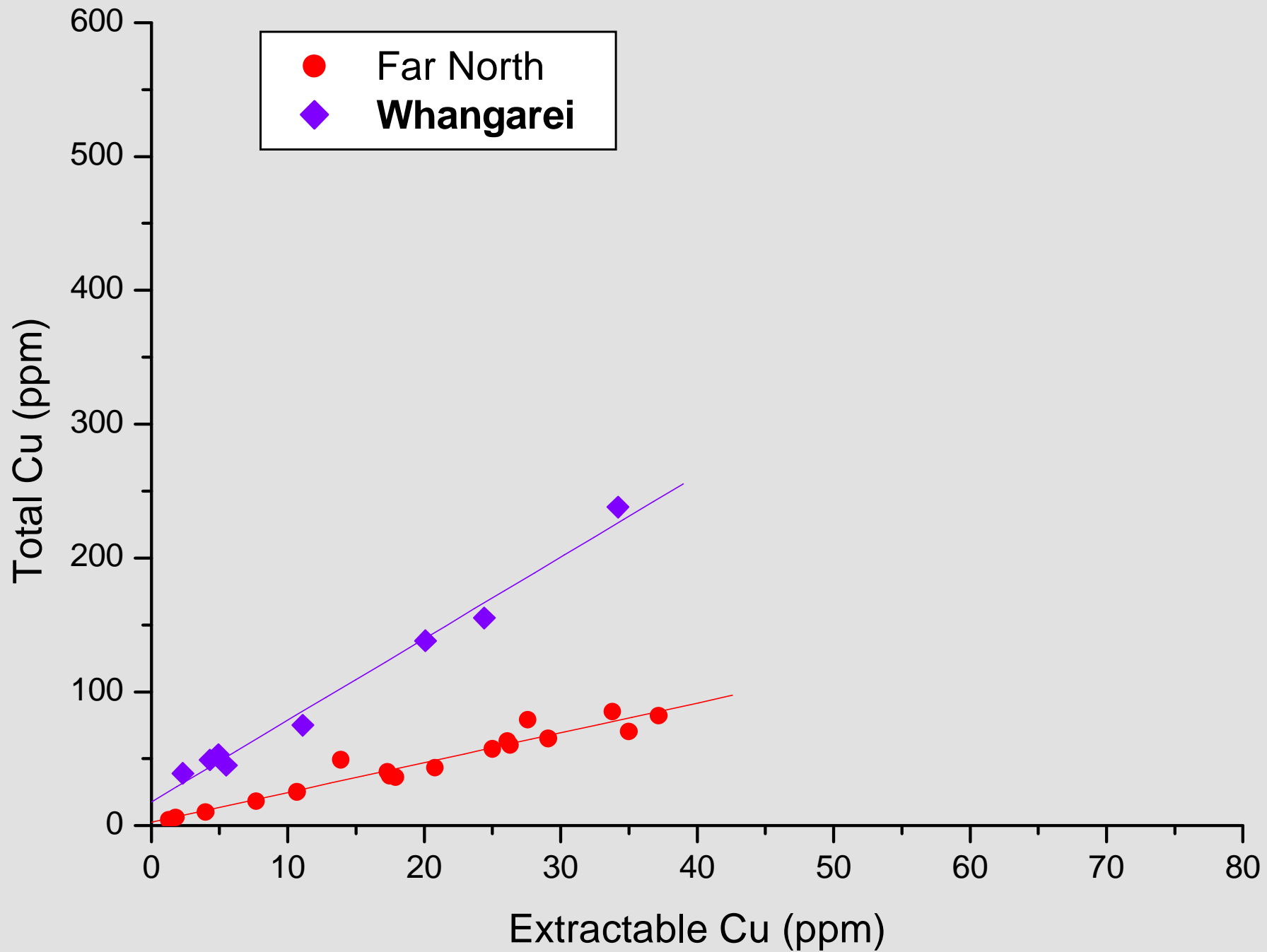


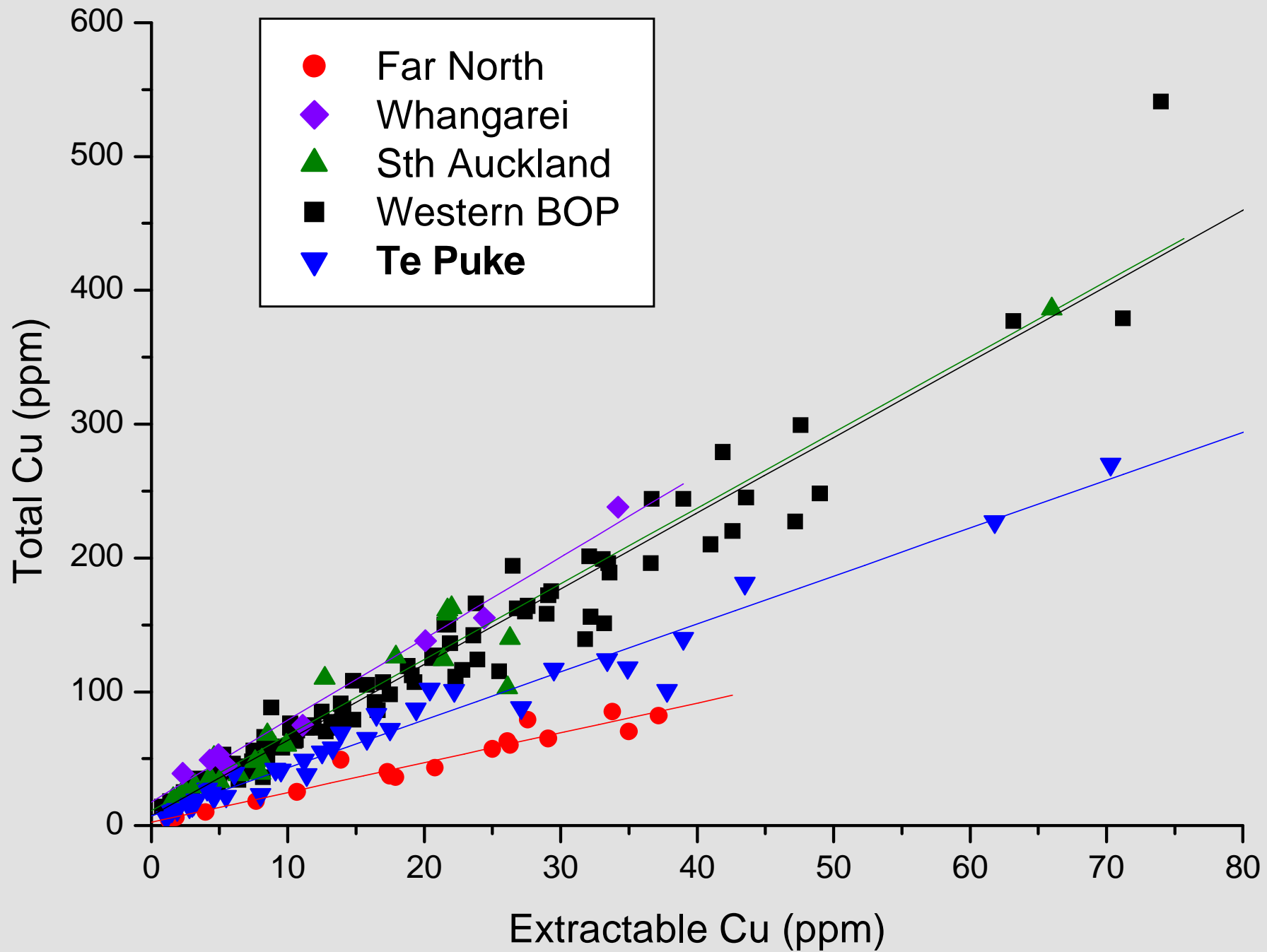
Regional differences

Comparison of standard soil test (Mehlich 3 = extractable) versus total soil copper:

- Soil retention is strongly influenced by regional soil characteristics







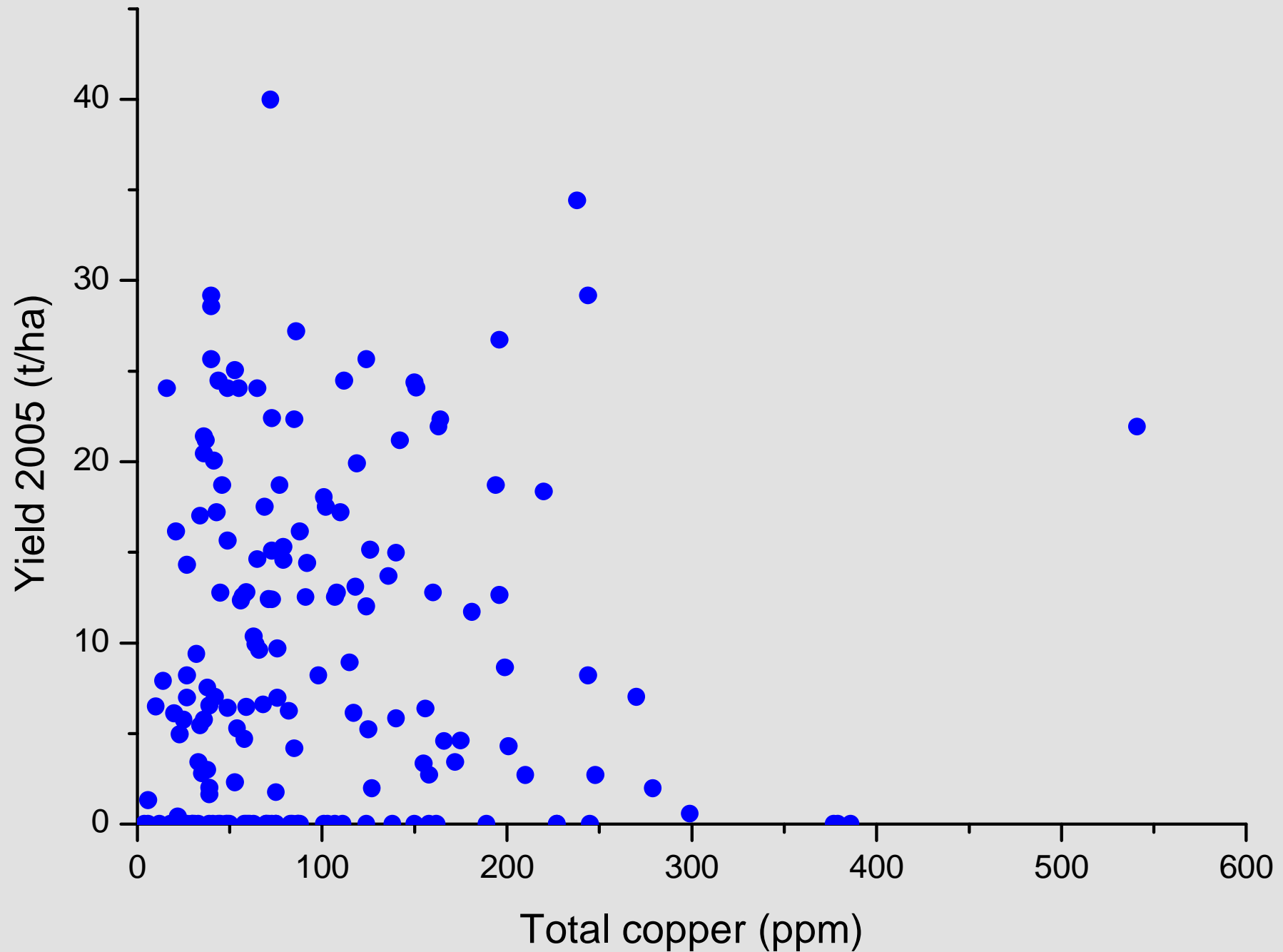
Productivity

- The core question regarding sustainable use of copper is:

Does soil copper have an influence on orchard yields?



Total soil copper does not affect avocado crop yield



Soil survey summary

- Copper is accumulating in soils.
- Average copper levels in avocado soils is lower than previous studies but range is comparable
- Strong regional relationships between total copper and extractable copper governed by soil types.
- No apparent impact of soil copper on productivity.



Is there an alternative?

- 12 orchards
- 20 trees in randomised block design
- Shirlan, Pristine, Copper, Untreated
- 5 single tree replicates
- 8 monthly applications
- Harvested in November 2008



Spray trial results

Treatment	% rots	P value	% efficacy
Pristine	33	<0.0001	50
Shirlan	46	<0.0001	31
Copper	49	<0.0001	27
Untreated	67		

N=4720

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Alternatives summary

- Both Pristine and Shirlan more biodegradable than copper
- Shirlan is as effective as copper, Pristine is more effective
- Either could be used in alternation with copper to reduce soil loadings
- But neither registered in NZ



Conclusion

- Have to position ourselves for ever increasing customer demands on “quality”
- AvoGreen[®] needs to evolve into a GAP-based system to address sustainability requirements
- Workable options for reducing copper use together with ongoing monitoring of soil levels
- Continue to rely on copper programmes in the interim



Acknowledgments

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Many thanks to all those growers who participated in the survey and allowed field trials on their properties

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Thank you



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