# IMPROVED TIMING OF PHOSPHONATE INJECTIONS FOR PC CONTROL IN NEW ZEALAND

**C Partridge**

*(Team Avocado/Avo Systems Ltd)*

# INTRODUCTION

- Soil applied Ridomil, Aliette foliar sprays and trunk painting were early *Pc* control measures.
- Injection technology initiated in early 1980's.
- Injection has since become a method of controlling *Pc* worldwide.

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# HOW DOES INJECTING WORK?

- Using low pressure syringes, a buffered phosphonate solution is injected into the trunks of avocado trees.
- Uptake time can vary considerably.
- Phosphonate moves up the tree in the xylem and then down to the root system via the phloem.
- Phosphonate accumulated in the root system protects against invasion by *Pc.*

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# MILESTONES INFLUENCING BETTER UTILISATION OF THE TECHNOLOGY

- Understanding the phenological growth cycles of the tree – 'sink strength' of different plant parts varies over time.
- Establishing critical root phosphonate concentrations required to attain *Pc* control (20-30ppm).
- Development of a commercial plant tissue phosphonate analysis service.

*(Darvas, Pegg, Whiley, Thomas et al)*

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# Team AVOCADO Management Calendar

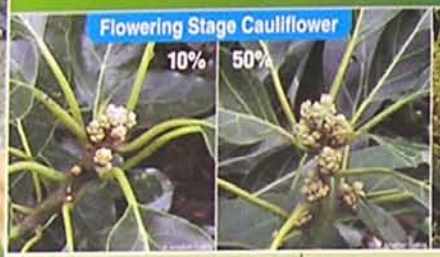
## Common insect pest and disease symptoms





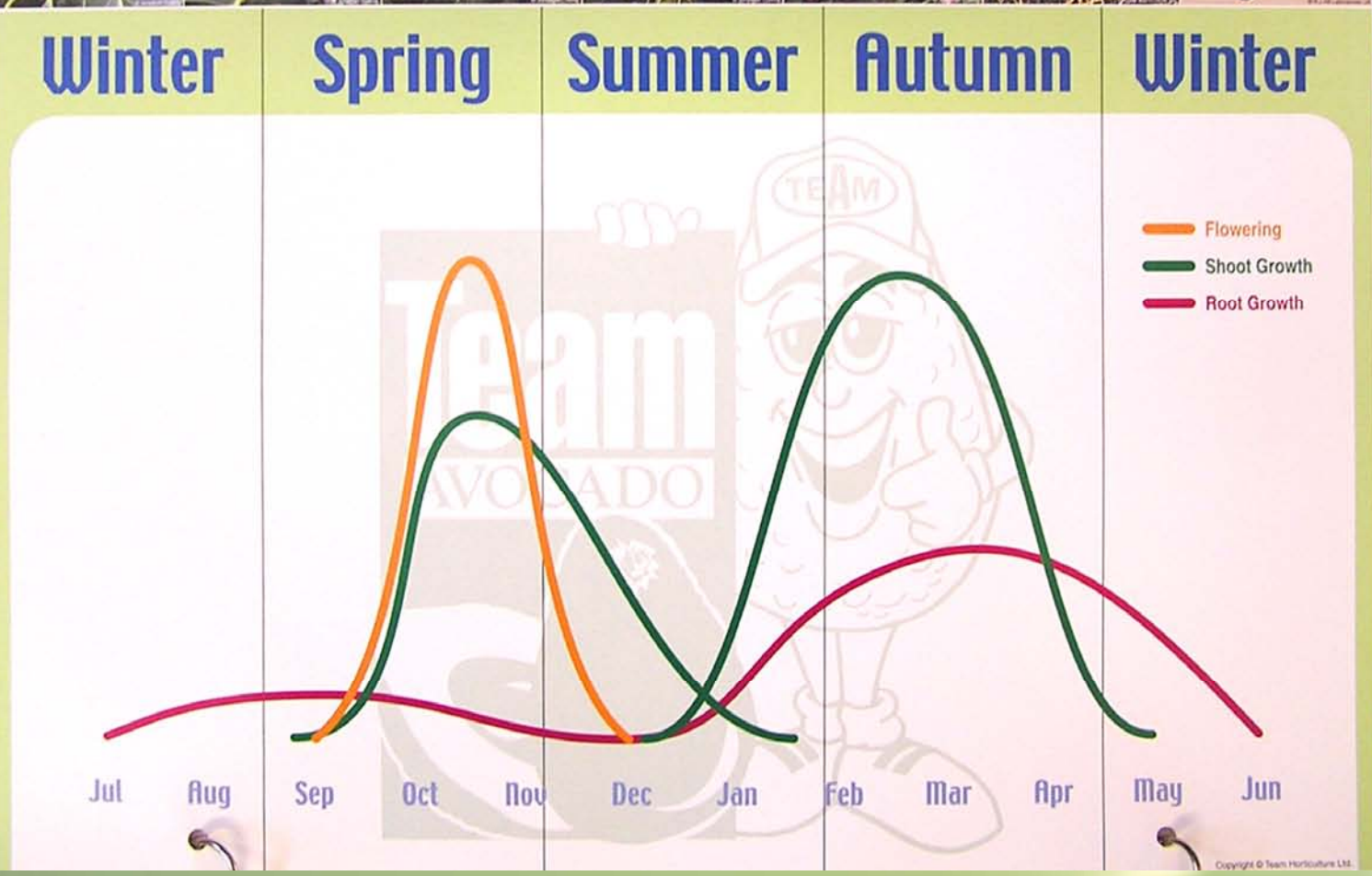


## Important growth stages








## Some common leaf and fruit defects







# RESEARCH YIELDS INTERESTING RESULTS

- Phosphonate applied aerially to Jarrah forests to control *Pc* in W Australia.
- Found that such applications severely reduced pollen viability of Jarrah.
- Trial done on avocados, found that *in vitro*, phosphonate concentrations of 2000ppm+, severely reduced avocado pollen germination.

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# THE AVOCADO TRIAL CONCLUDED...

- Foliar applications of phosphonate to avocados should be avoided at flowering, especially if conditions for fruitset are known to be less than ideal.
- Provided this is done, no negative affects should be found.

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# OK, BUT...

- We don't foliar spray in NZ - it is being found to be less effective than injecting in Australia as well (*Thomas et al*).....

  we INJECT our trees.
- We often have conditions less than favourable for fruitset.

# TIMING CAN MAKE A DIFFERENCE

- For very sick trees, one could argue that almost **any** time is a good time to inject.
- Injection timing recommendations vary from country to country (different phenological cycling).
- For NZ – 'best administered during summer between early spring (July/Aug) and a secondary injection in the New Year period'. 'Where actively growing shoots are present, phosphonate remains fixed in leaf tissue and does not reach the roots'.

(*Cutting & AIC Growers Manual*)

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# SO, IS THE TIMING FOR NZ CONDITIONS OK?

- For 'healthy' trees, I think not, because:-

  **1.** July/Aug/Sep is a time when expanding flower buds are the strongest sink.

  **2.** If phosphonate can negatively affect pollen viability, that would make early spring an even worse time to inject.

  **3.** Commercial root phosphonate monitoring gave indications that July/Aug treatment often gives poor phosphonate persistence in the roots.

# TIMING (continued)

**4.** Feb/Mar treatment however, appears to give persistence for up to 11 months in many cases.

This makes sense, since shoot flushes are more mature and roots are becoming a stronger sink at this time.

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# SOME COMMERCIAL RESULTS

| Grower | Injected | Analysed | ppm |
|---|---|---|---|
| A | Sep 01 | Sep 02 | 16 |
| B | Sep 02 | Jan 03 | 12 |
| C | Aug 02 | Jan 03 | 26 |
| D | Feb 02 | Aug 02 | 34 |
| D | Feb 02 | Jan 03 | 21 |
| E | Mar 02 | Jan 03 | 90 |

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# A TRIAL TO CHECK PHOSPHONATE CONCENTRATION IN FLOWER TISSUE WAS DONE

- Two sites (Lankshear & Cotterell) were chosen
- Treatments at both sites as follows:-
  (all sites – 5 trees per treatment)
  -Inject in Aug 03 with 15% HiPK
  -Control (no injection)

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# MEASURED

- Phosphonate concentrations in the roots prior to injecting.

- Phosphonate concentrations in the roots *and* developing flower buds at various times after treatment.

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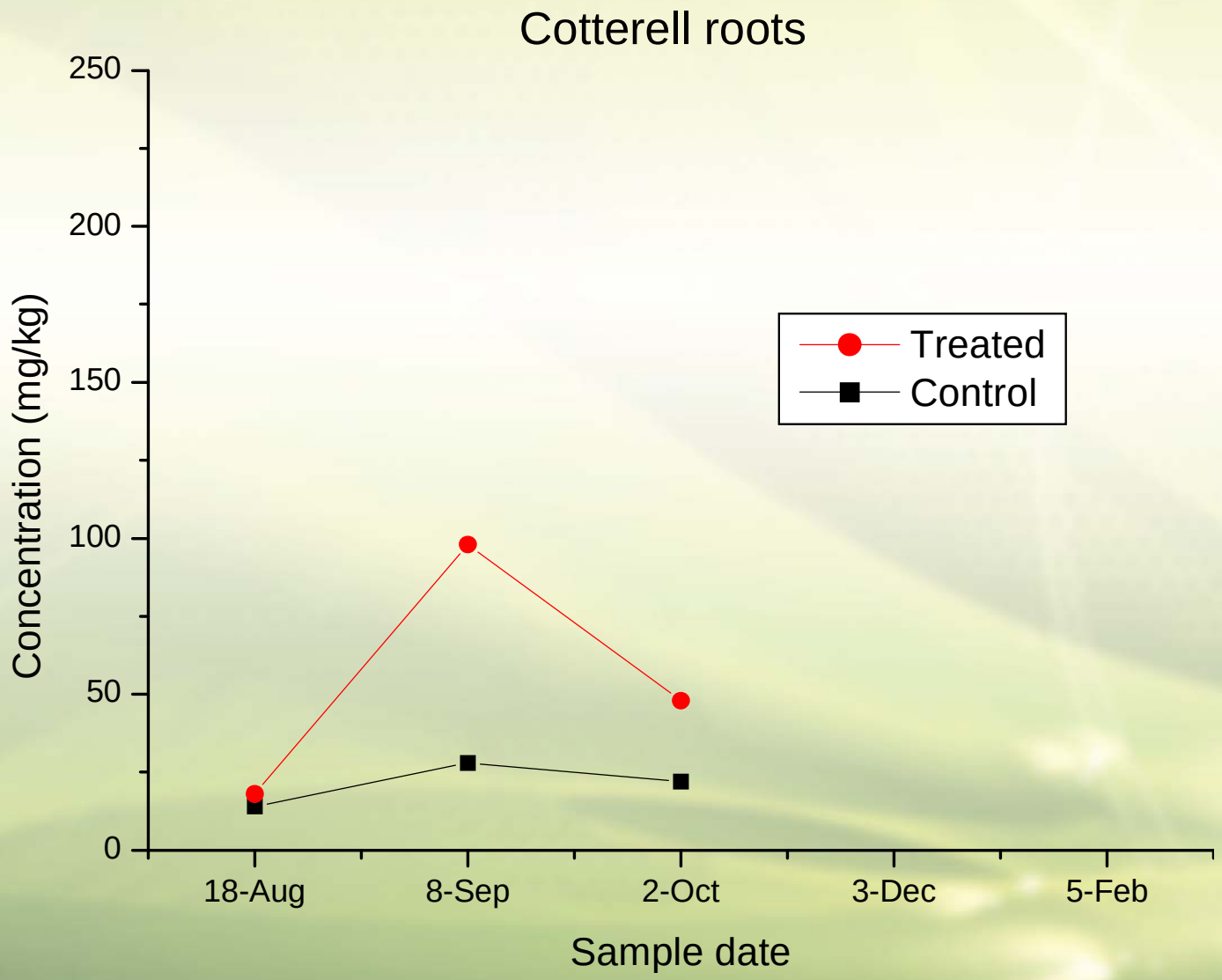
# RESULTS

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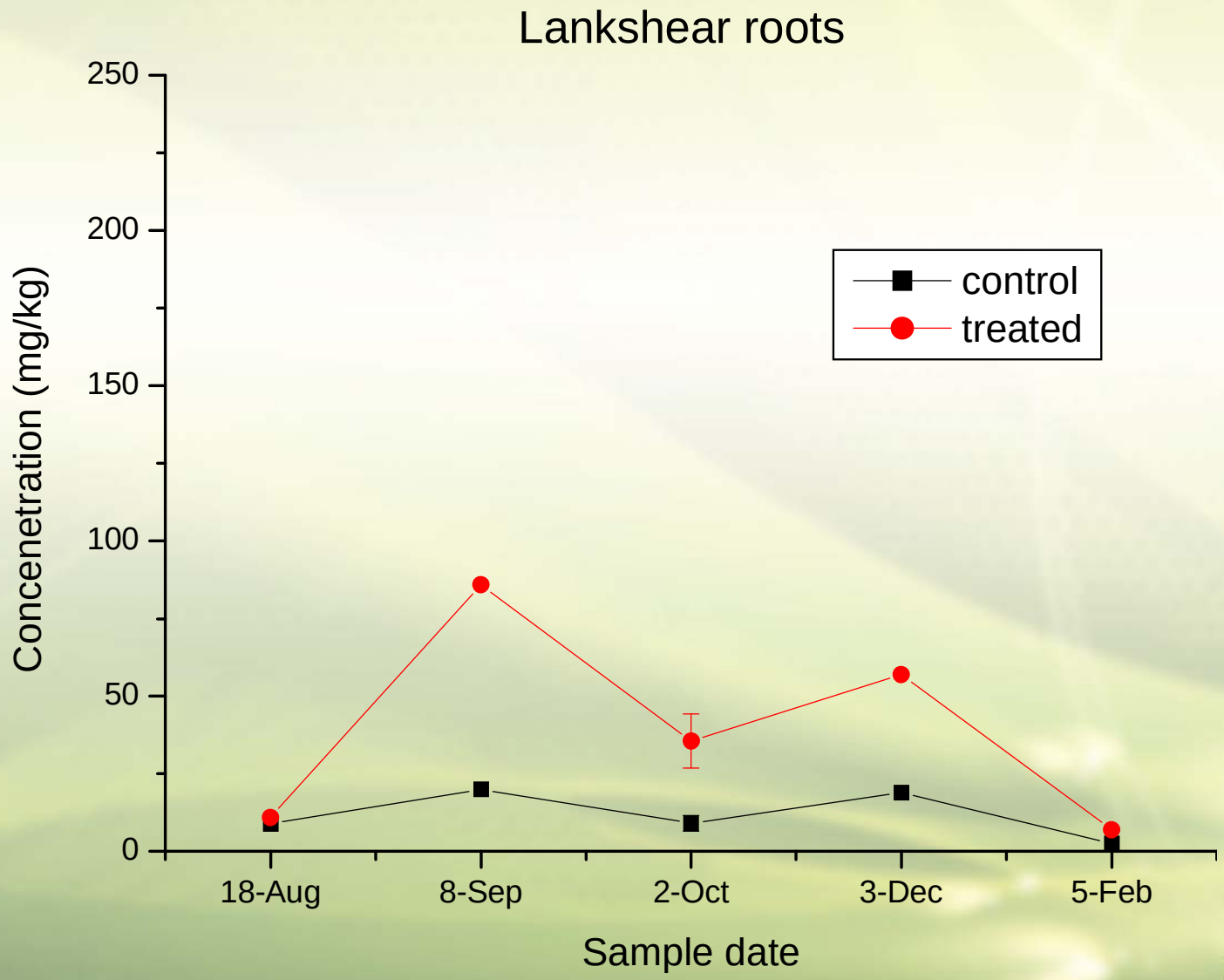
# RESULTS (continued)

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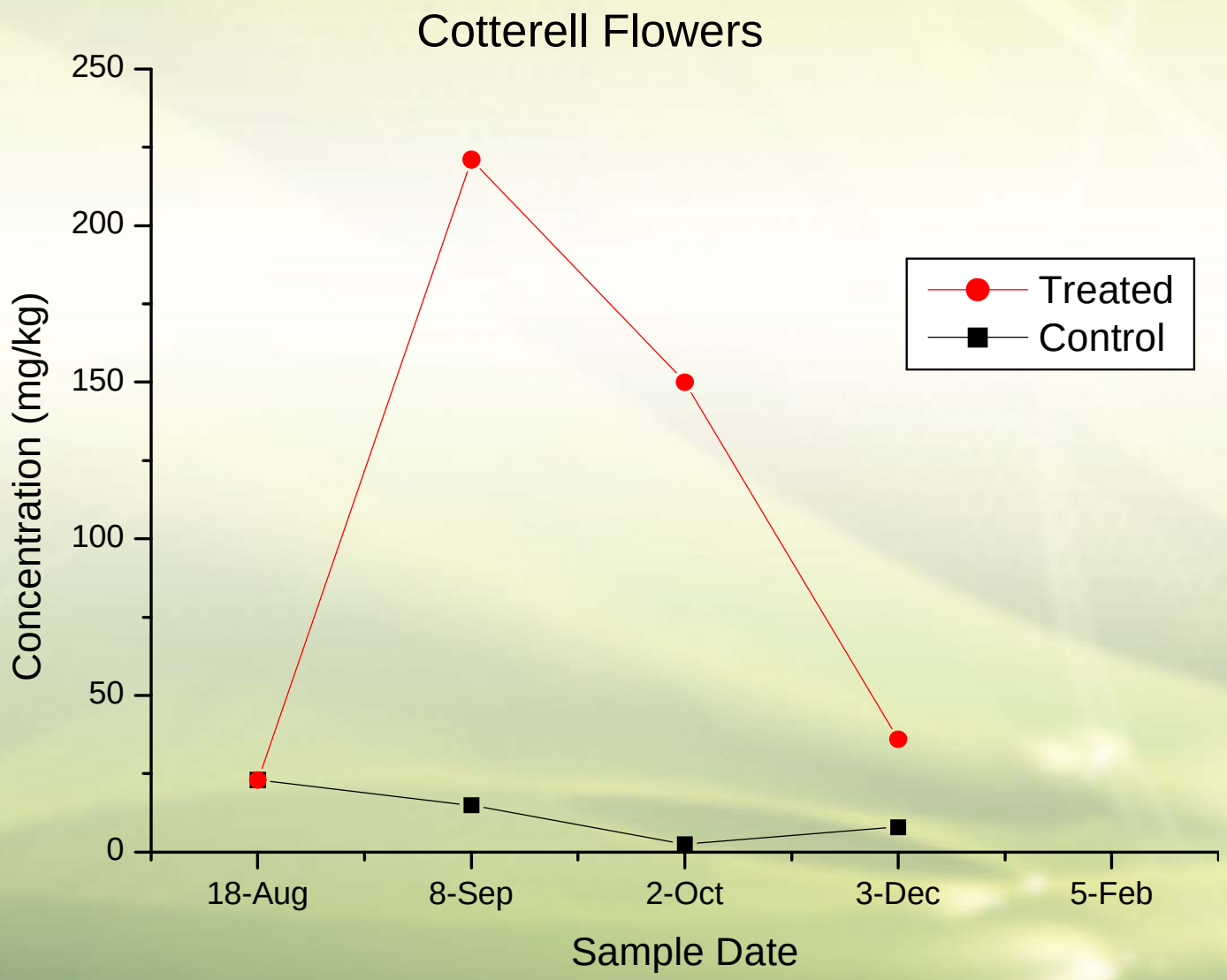


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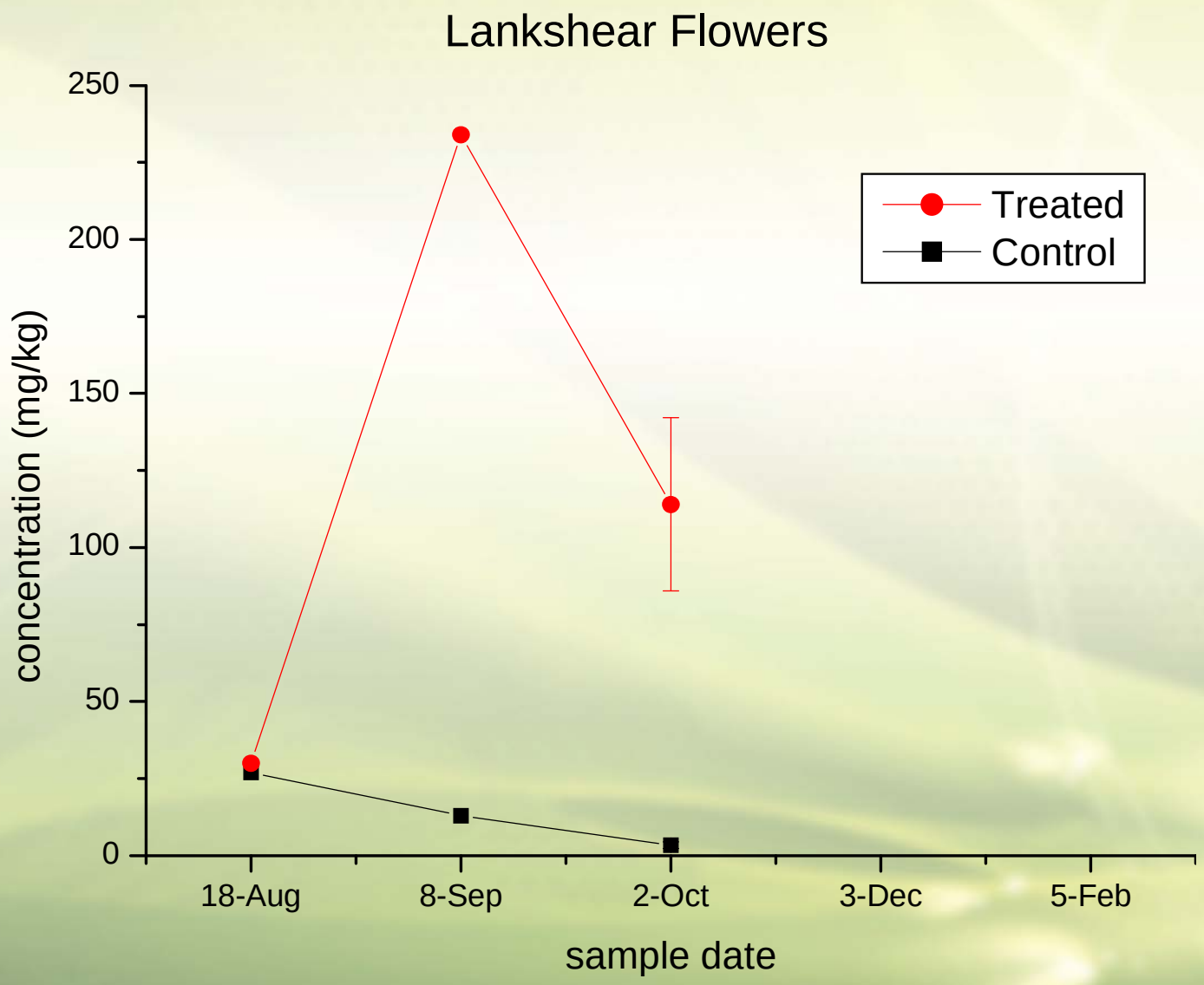
# RESULTS (continued)

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# DISCUSSION

- Root phosphonate concentrations for Aug injected trees, dropped to below the threshold of 30ppm within 5 months at Lankshear.
- Flower phosphonate levels peaked rapidly, reaching 200ppm – flower tissue is a strong ‘sink’.

# PRACTICAL IMPLICATIONS

- There is a question mark about a 200ppm effect on pollen viability *under field conditions.*
- Would the concentration be more dilute in large trees?
- From commercial results for healthy trees, injecting in Feb/Mar appears to be a 'better' time to inject and would be my recommendation if injecting once per year in New Zealand.

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# ‘FIELD’ COMMENTS

- Feb/Mar is a more ‘comfortable’ time to inject.
- In Feb/Mar, uptake is much faster.
- For very large trees, 15% sometimes still struggles to achieve a root level above 30ppm – consider using 20% on large trees if injecting once per year.

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# THANKS TO...


- **Aongatete Coolstores** for financial assistance.
- **Aongatete field staff** for doing the injecting.
- **J & C Cotterrell & J Lankshear** for use of their trees.
- **H Pak** for trial design & data analysis.
- **T Whiley**, **G Thomas** & **S Ogle** for helpful discussion.


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