

# Managing *Phytophthora cinnamomi*

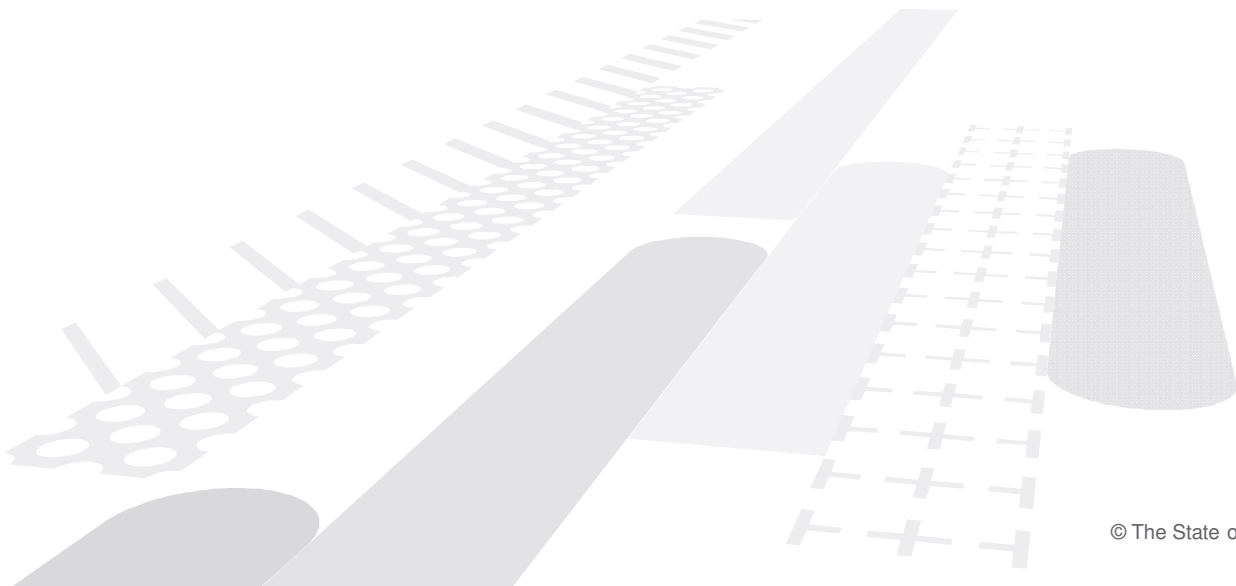
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# Topics covered

- Experimental results
  - Rootstock trials
  - Optimisation of phosphonate applications
- Integrated control



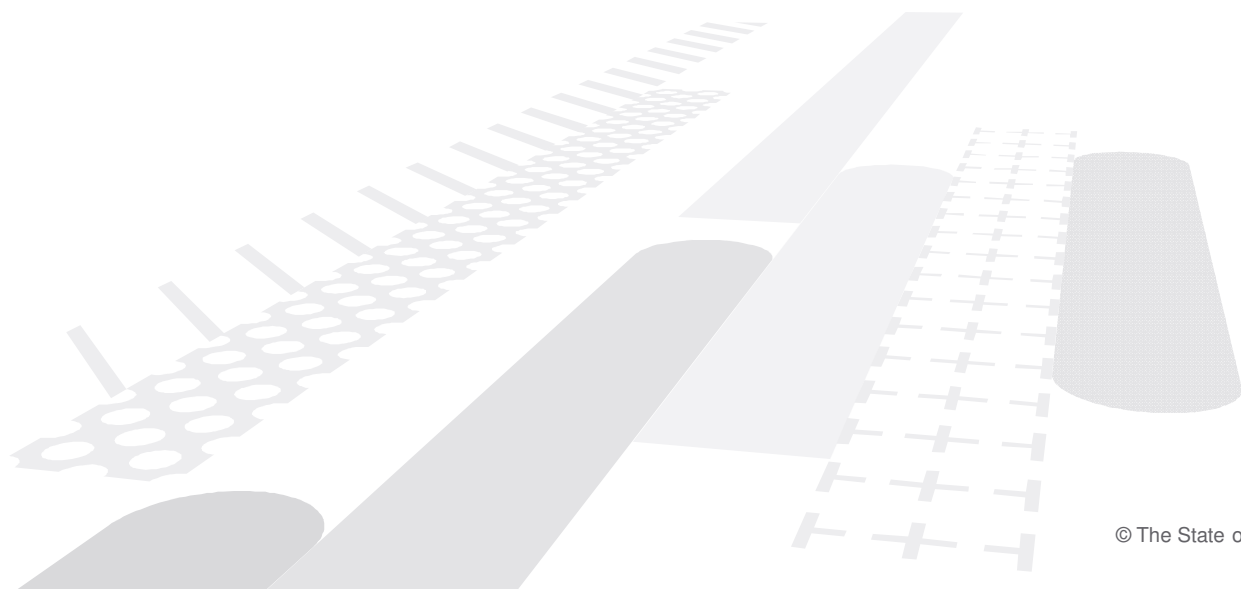
## Phytophthora root rot (PRR)



## PRR linked to seasonal physiology of the tree

- temperature & soil saturation play a major role in PRR severity
- Optimum temperature for
  - PRR development 19 – 25 °C
  - Avocado growth 21 – 33 °C
- < 22 °C root growth slows = PRR severe
- > 27 °C avocado grows better than  $P_c$  = PRR less severe
- $P_c$  stress on trees greatest in spring

# Effect of rootstock on PRR



Velvick clone (7.7)  
Reed (8.3)

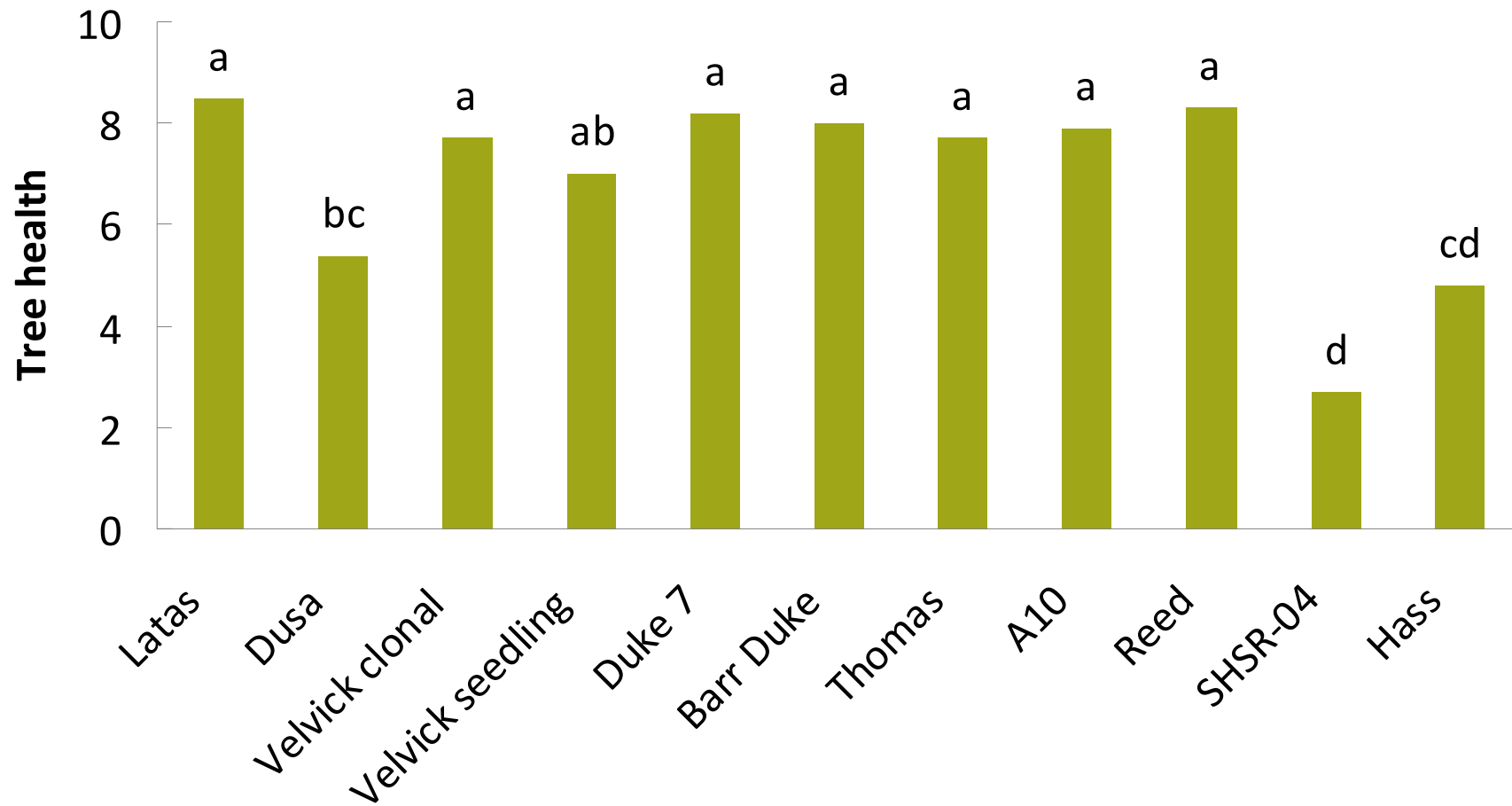
SHSR-04 (2.7)



Clonal Hass (4.8)



# Duranbah rootstock trial, tree health

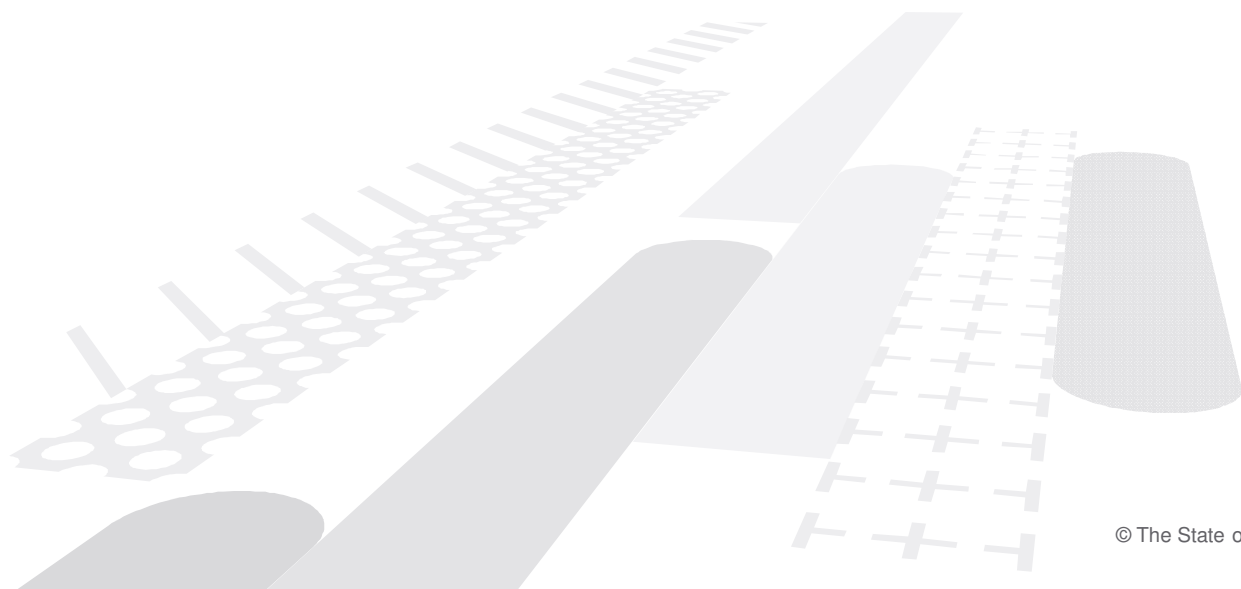


This work is continuing...



SHSR-02

# Optimising phosphonates



# How do phosphonates work?

## Dual action:

- High root levels – direct antimicrobial action
- Low root levels – plant defence responses activated
- Moves with photosynthates, accumulates and persists in plant tissue with greatest metabolic activity at time of application

## Methods of phosphonate application

- Trunk injections
- Foliar sprays
- Bark application
- Soil application

*Phosphonate applications must be continued for the life of the tree*

## Trunk injection

- Most effective treatment – 20%  $\text{PO}_3$  injected at even spacing around the trunk (15mL per metre canopy diam.)
- Central wood retains its transport function (unique in avocados)
- Injury to xylem near injection site
  - Becomes non-conductive
  - Replaced by tree in 1 – 2 years
- Healthy trees – 1 annual injection at maturation of summer flush
- Sick trees – 2 injections - at maturation of both summer and spring flushes

## Foliar Sprays

- Achieve same root concentrations as injections
- Need to monitor root levels to determine number of applications necessary
- 0.5% (8.3mL/L of the 600 product)
- More sprays required to achieve 0-50ppm, than >50ppm
- No applications within 6 weeks of flowering

## Bark Sprays

- Highly effective in young trees where stem has some photosynthetic (green) activity
- Very effective against trunk cankers
- Unable to achieve and maintain adequate root levels in older trees, unless applied frequently
- 20% product with 2% bark penetrant
  - Higher than 20% causes chemical cincturing

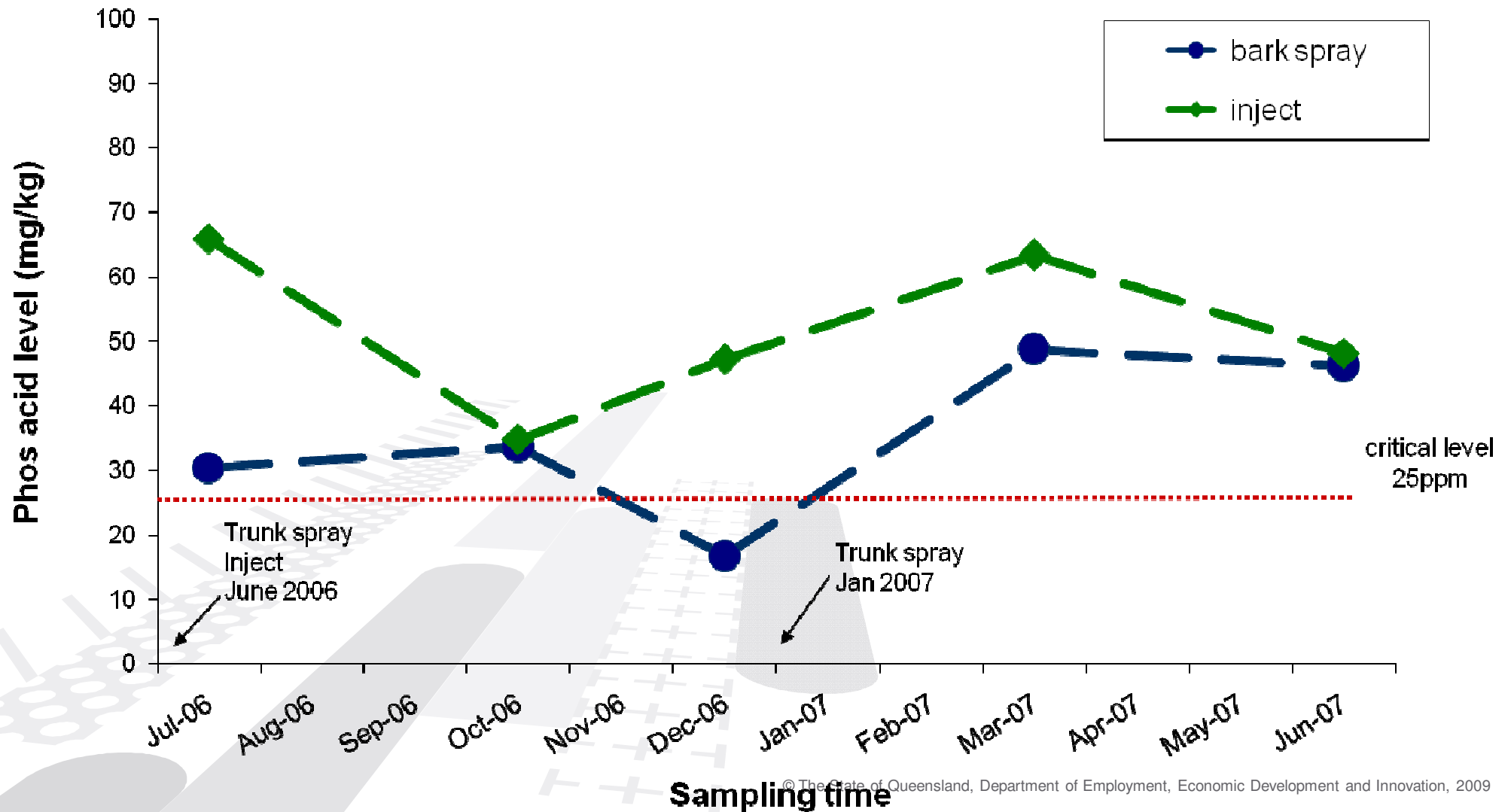
# Soil Drenching

- Initial increase in root concentration but quickly declines
- Need to apply monthly to maintain root levels
- Moves in xylem with water transport, thus not effectively distributed to target tissues

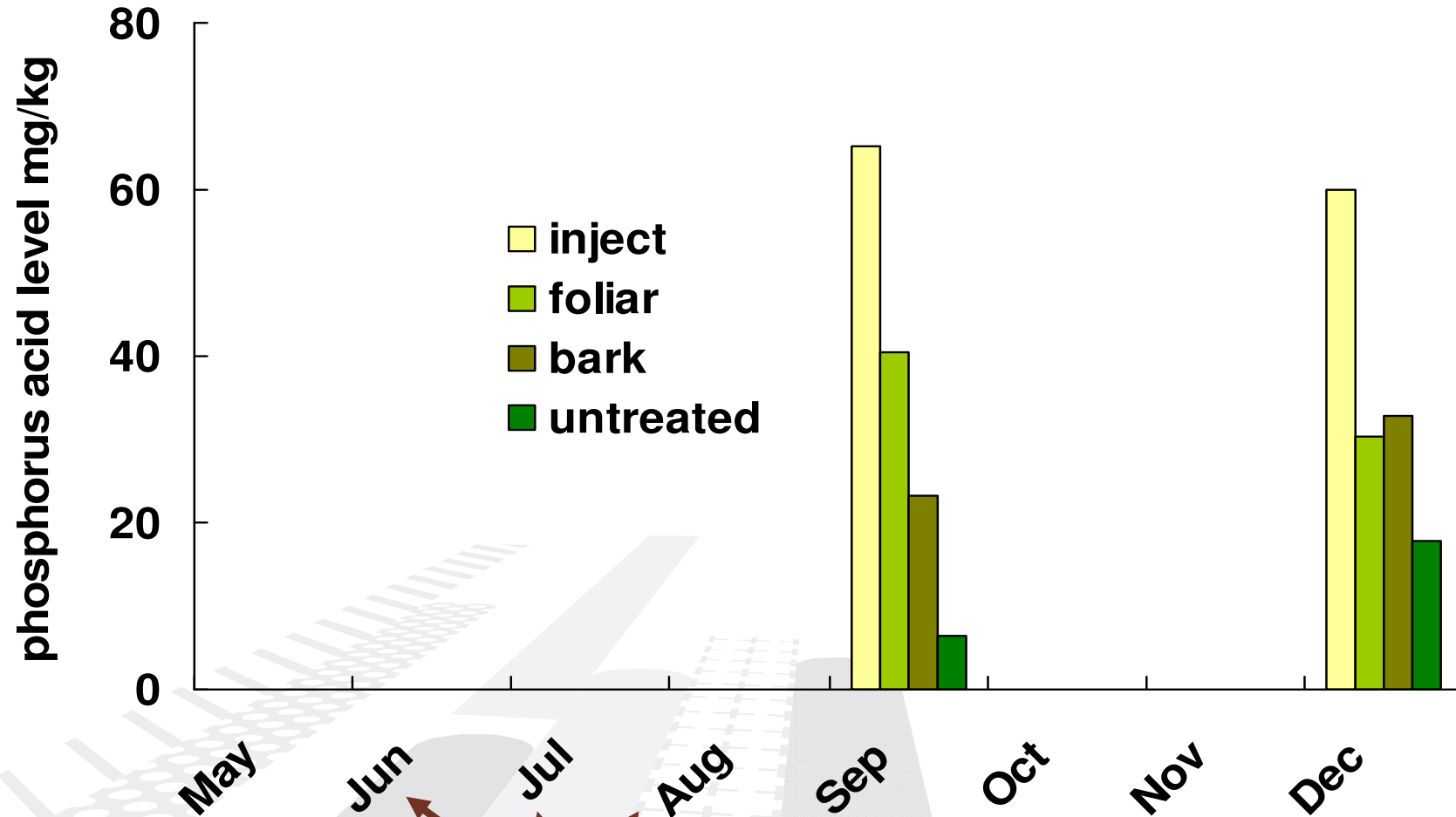


# Phosphonate - inject vs trunk spray

## Root levels



# Later maturing varieties eg. Reed



**Inject, bark, foliar**

**Foliar**

## Think about using metalaxyl

- Upward movement in transpiration stream – taken up only by roots
- Prevents colonisation of roots by zoospores (major)
- Toxic to germinating chlamydospores (minor)
- If feeder roots healthy, will be absorbed before degradation by soil micro-organisms
- Off patent (cheaper)



## Integrated control

- Drainage
- Nursery practices
- Cultural control
- Resistance
- Chemicals
  - Phosphonates
  - Metalaxyl



## Acknowledgements

**Thank you to the many growers  
and collaborators for supporting  
our research!**



*Know-how for Horticulture™*

