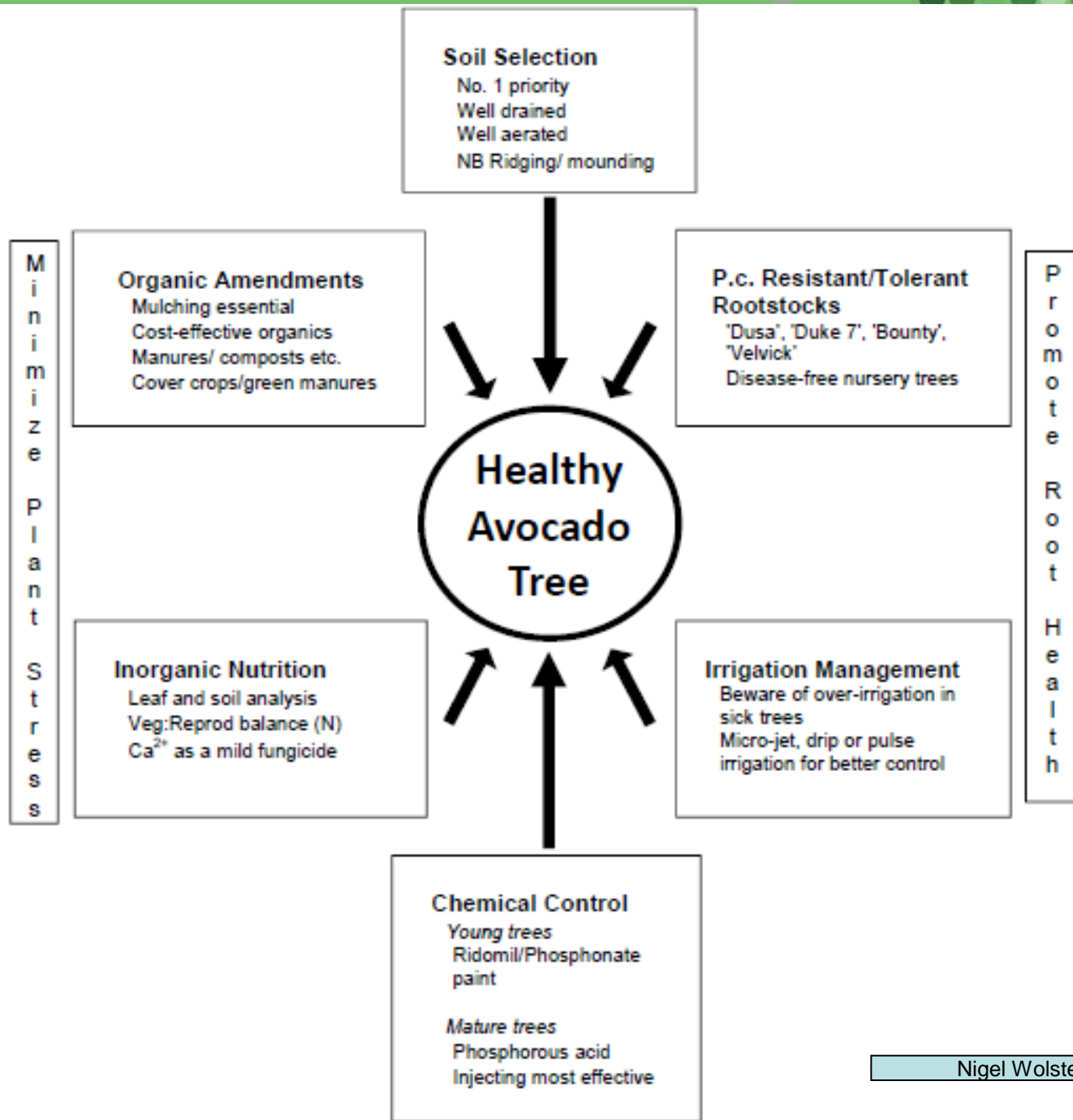


Integrated Control of Phytophthora

Control measures for discussion

K. G. Pegg





Soil Selection-C1

- Drainage the most critical factor
- Without good drainage, all other controls will fail







Rootstocks-C2

- Tolerant rootstocks – many now available
- Still not adequate to cope with high Pc pressure without other control measures
- Scion overgrowth – some root starvation due to partial incompatibility – aggravates the Pc problem



Effect of graft union on roots



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Irrigation-C3

Disease development can be modified by
regulating irrigation



Inorganic Nutrition-C4

- Calcium is a mild fungicide, improves soil drainage and thereby aeration and increases resistance to Phytophthora
- Can be applied as sulphate (gypsum) – slow release of Ca^{++}
- Ammonium ion is toxic to Phytophthora and avocado feeder roots
- If applied to a mulch ammonium sources must be used sparingly




Manage summer growth flush

- A good summer growth flush is a major contributor to winter starch accumulation and promotes good root growth during autumn/winter
- Trees with good root growth better able to cope with Pc and flowering and fruit set in Spring
- Requires a high standard of general tree nutrition especially Nitrogen balance



Mulching-C5

- Woody mulch (C:N ratios 25-100:1)
- Provides oxygen rich environment for feeder roots
- High biological activity
- Enzymatic degradation
- Soil modification – low bulk density in surface soils



Ashburner System of Biological Control





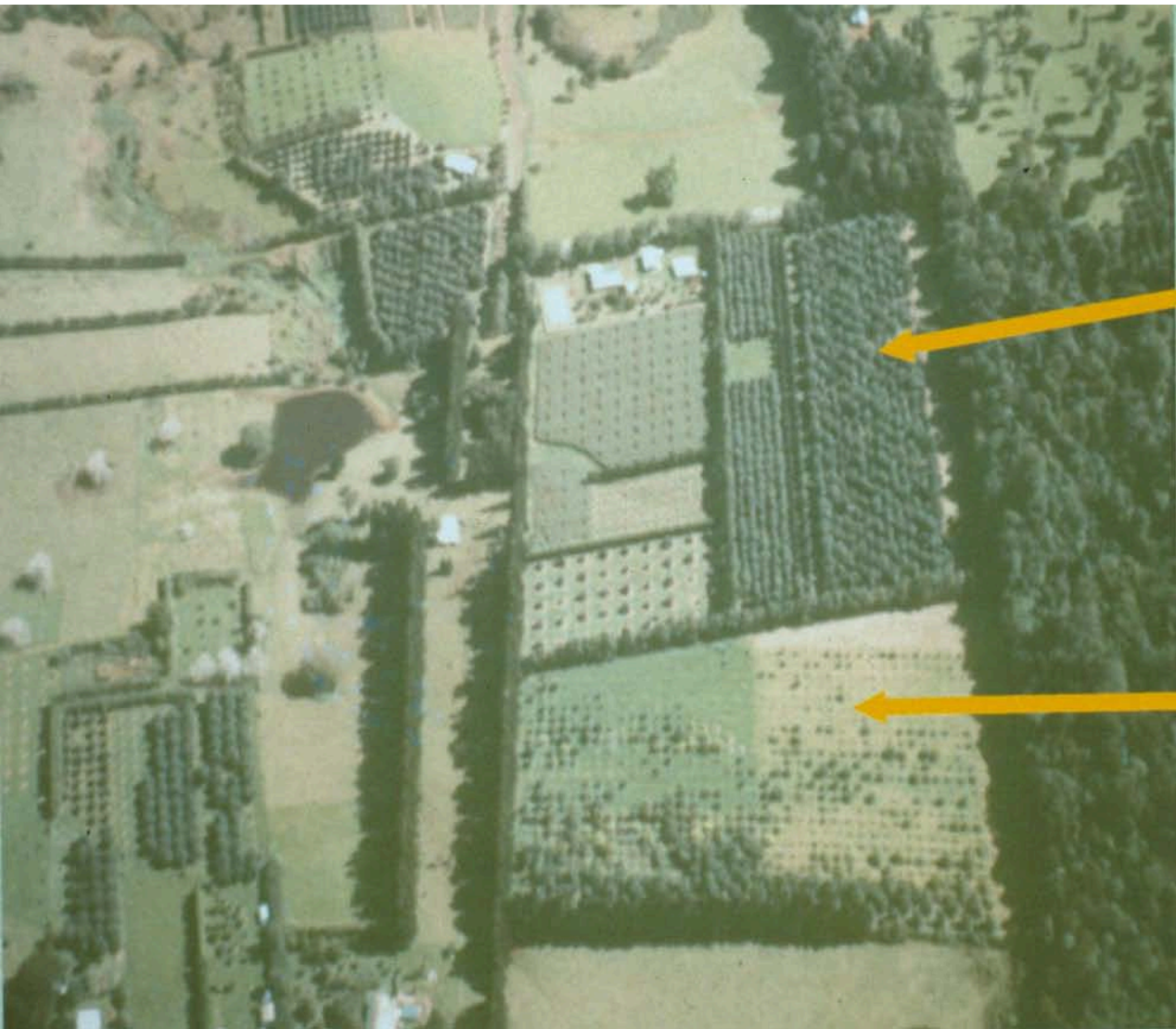






Suppressive Soil

- Cation exchange capacity, exchangeable Ca, Mg, N and organic matter higher in suppressive than conducive avocado soils
- Total exchange capacity depends on organic matter as kaolinite has low CEC
- Suppressive avocado soil comparable with rainforest soil
- Disease suppression due to total physical, chemical and biological properties
- Suppression fails where drainage inadequate



Organic Matter

+

**ANVAS
trees**

No organic matter

**Infected nursery
trees**



Phosphonates-C6

Without phosphonates (injections/sprays)
many avocado orchards would fail





Control

Dip 0.5% PO3

Dip 0.5% PO3 + high volume spray at 3 months



Phosphonates-C6

The effectiveness of phosphonate depends on sensitivity of the pathogen and the capacity of defense responses in the host

Pineapple Pc

Pineapple cv.	Resistance/ Susceptibility	PO ₃ rate
1	Highly resistant Hypersensitive response	Not required
2	Restrict colonization Root regeneration	0.1%
3	Susceptible	0.25%
4	Highly susceptible	0.5%

