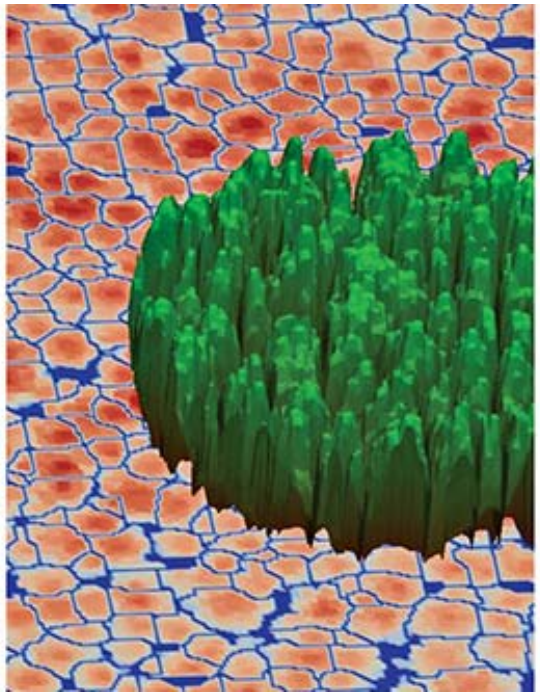
Growing confidence in forestry's future Research Programme

SCION
FORESTS ▪ PRODUCTS ▪ INNOVATION

Advances in nutrition management of radiata

Graham Coker, Peter Clinton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Research Aim 1.2 Enhancing the productivity of older stands

RA GOALS

- Identify and screen new treatment options
- Better understand which nutrients are limiting crop growth and why (process and mechanisms).
- Establish field trials to investigate wood quality and environmental effects

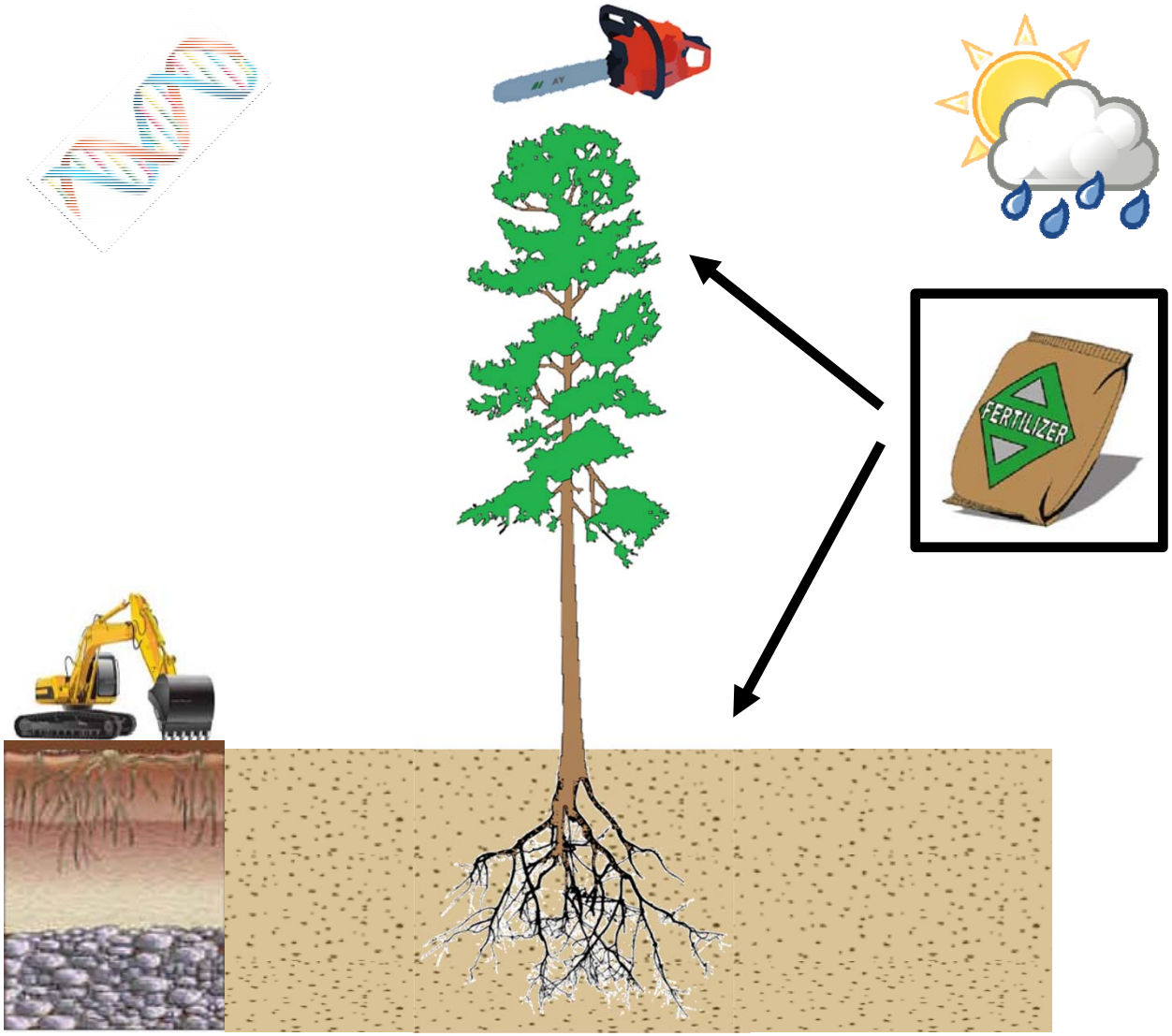
TODAYS PRESENTATION

- Overview of the approaches taken
- Describe some of the results
- Summarise advances in our understanding

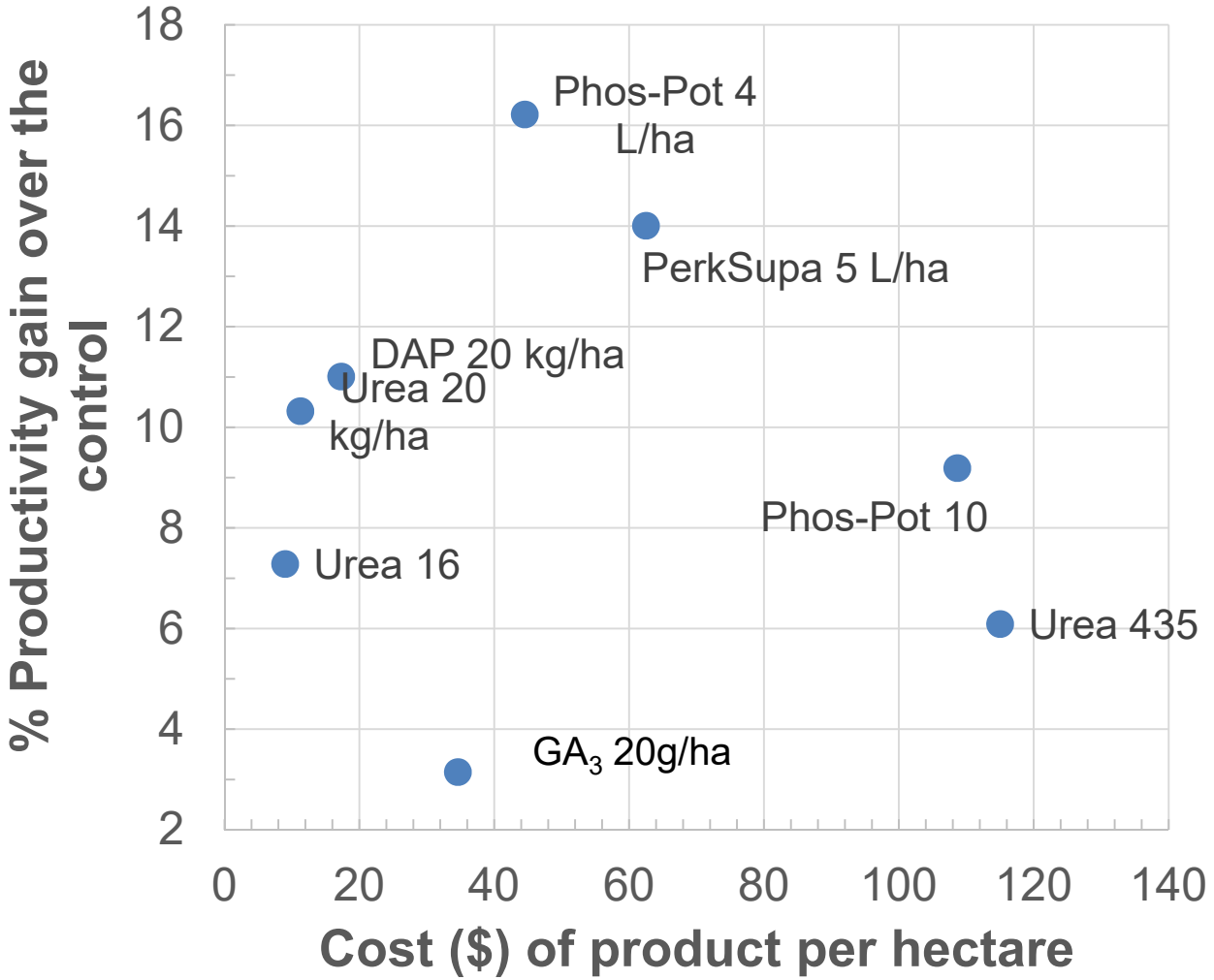
OUTCOMES by 2019

- Better understanding of the role of nutrients in wood formation
- A new understanding of the role of nutrients in signalling stress
- Better methods for predicting responses to mid-rotation interventions and updated DSS response functions

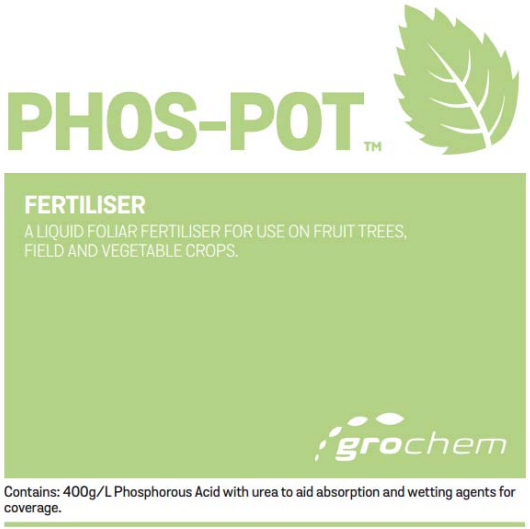
Overview – mechanisms for change



Advance 1 – Identified new treatment options, screening trials in 2016

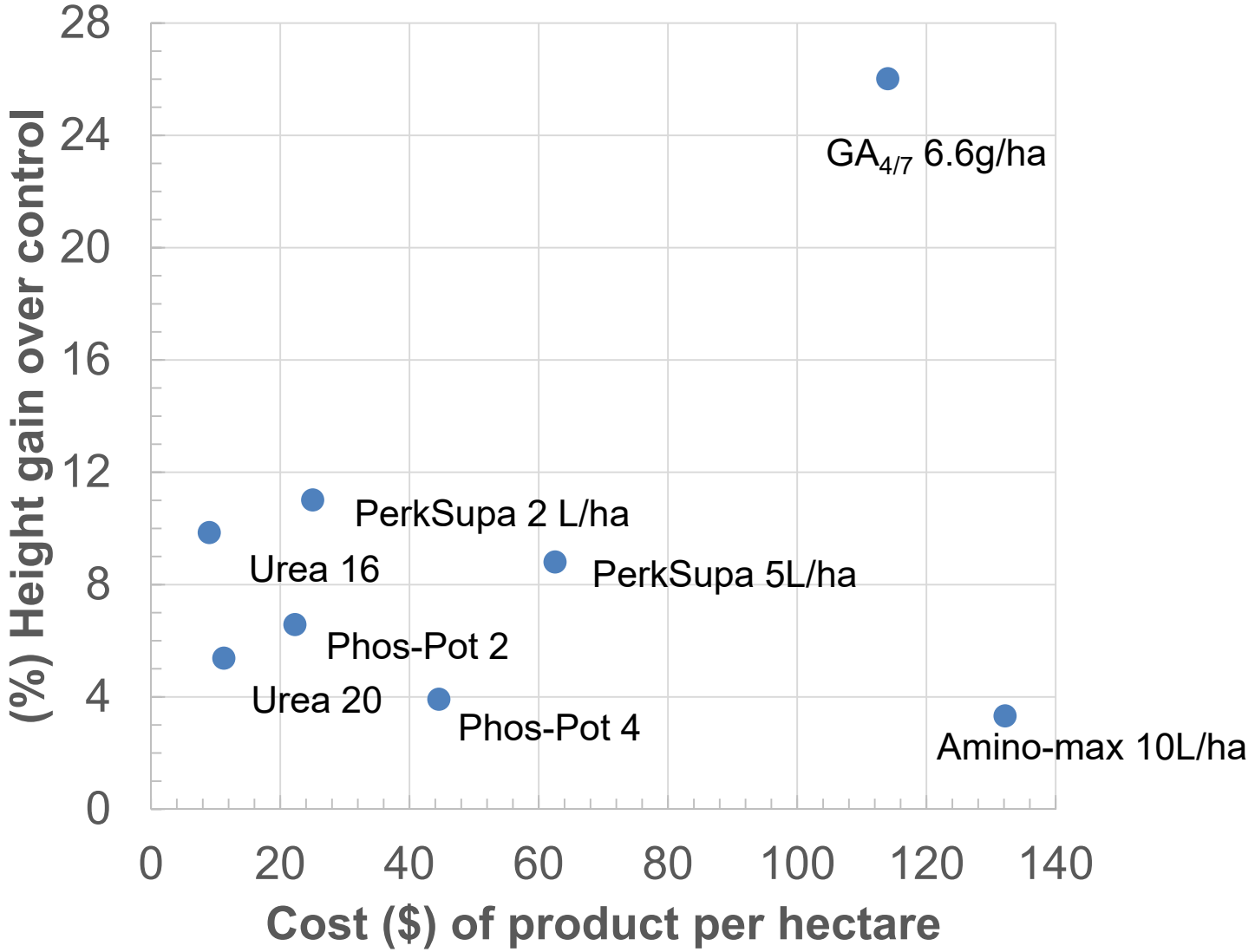


Control = untreated above ground biomass of GF19's



http://grochem.co.nz/Portals%5C537%5Clabels/Phospot_20L.pdf
http://www.keyindustries.co.nz/product/Perk+Supa-1018.htmx

Advance 2 – Investigated genotype responses, interim results, 2017



Control = untreated height of 12 genotypes, each having 18 reps, Trts :. 216 individual plants

Trials to date show

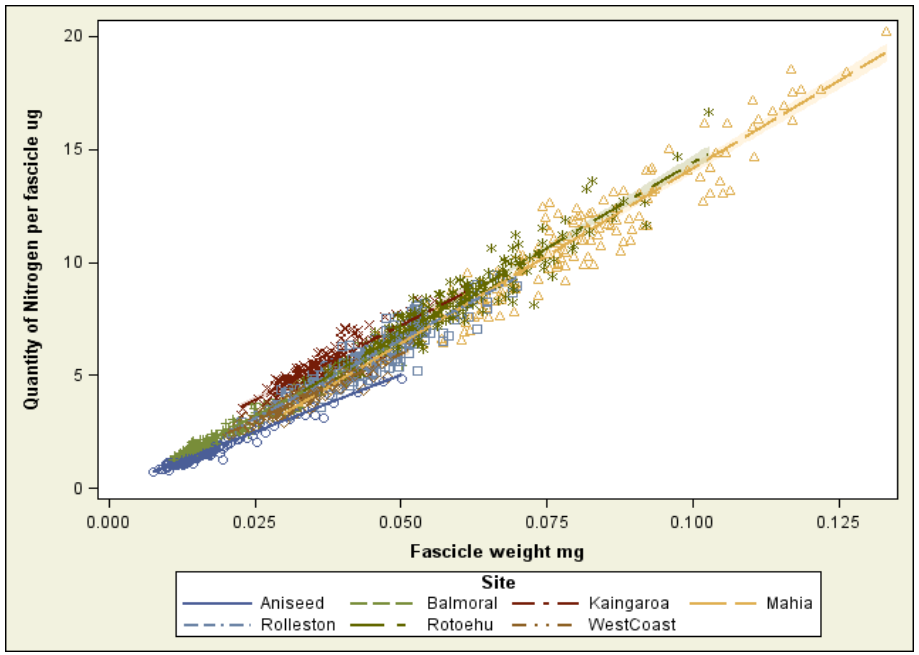
1. Foliar applications of nitrogen and phosphorus are more cost efficient compared with conventional operations, based on results to date.

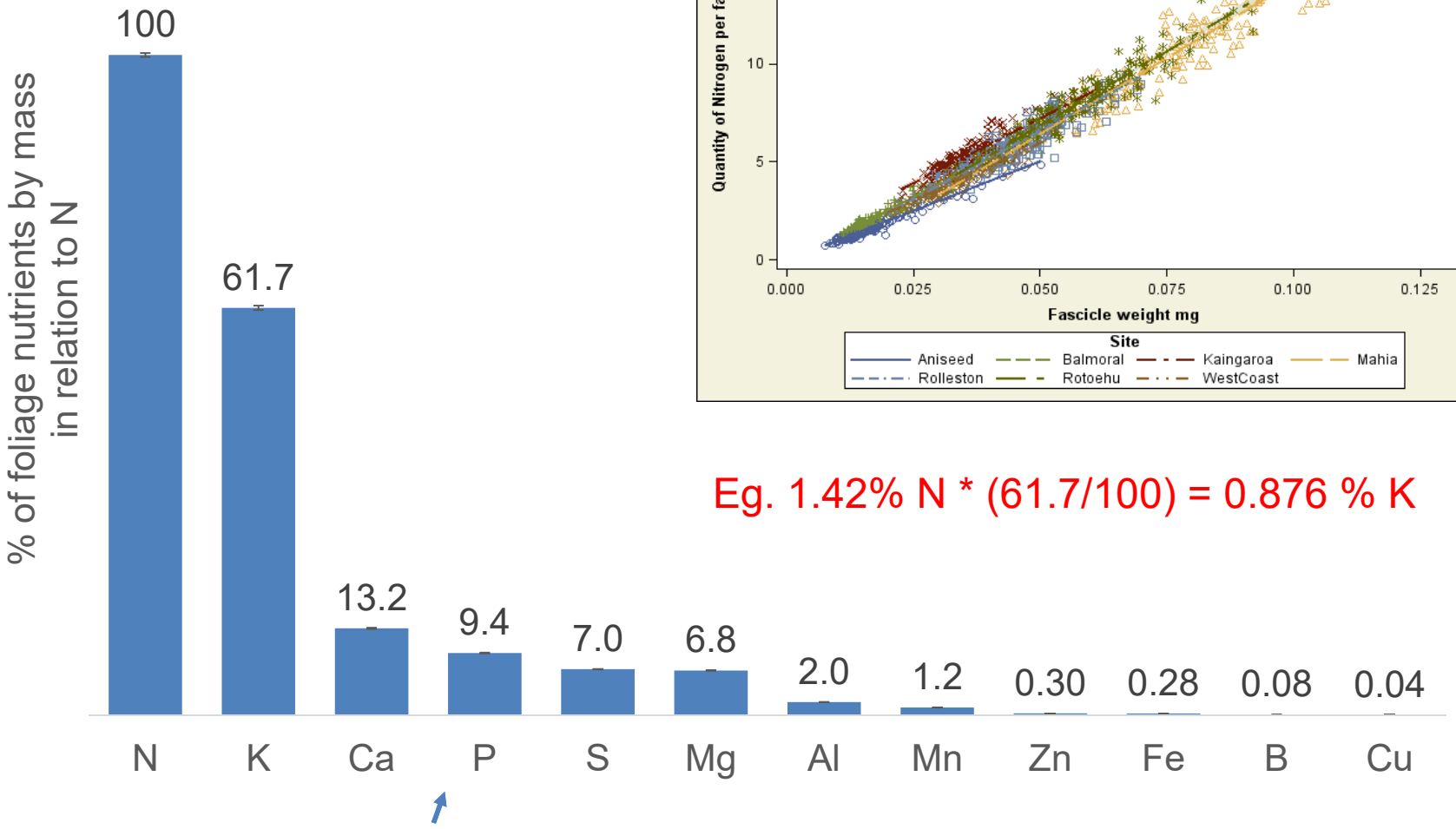
   These treatment options will help growers better match crop demands with supply at all stages of stand development, where intervention is justified.

2. The relationship between productivity and foliar applied N is consistent across the rates applied.

   Every dollar spent on N provided a 2% gain in productivity.

Advance 3 – Improved understanding of foliage nutrient ratios

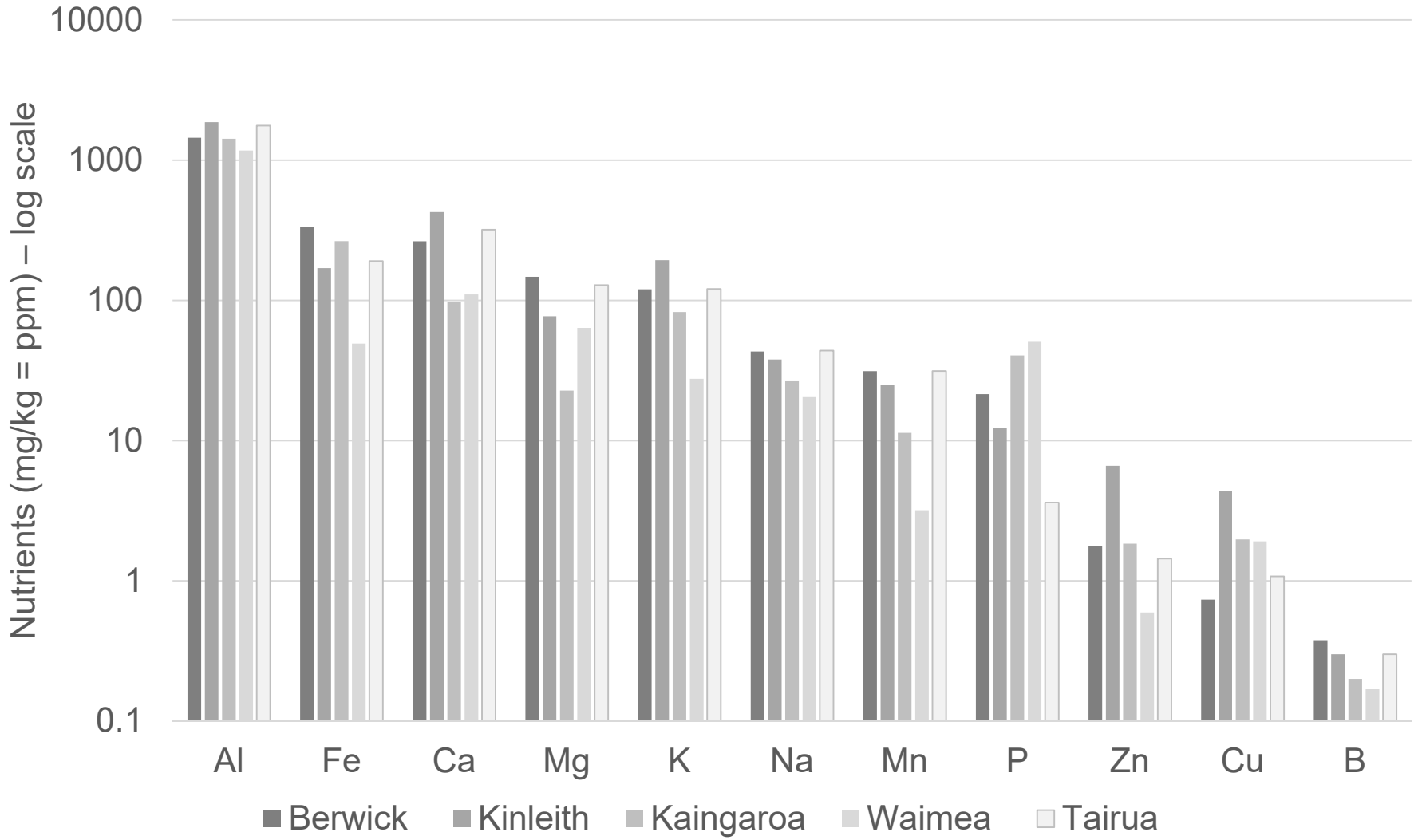




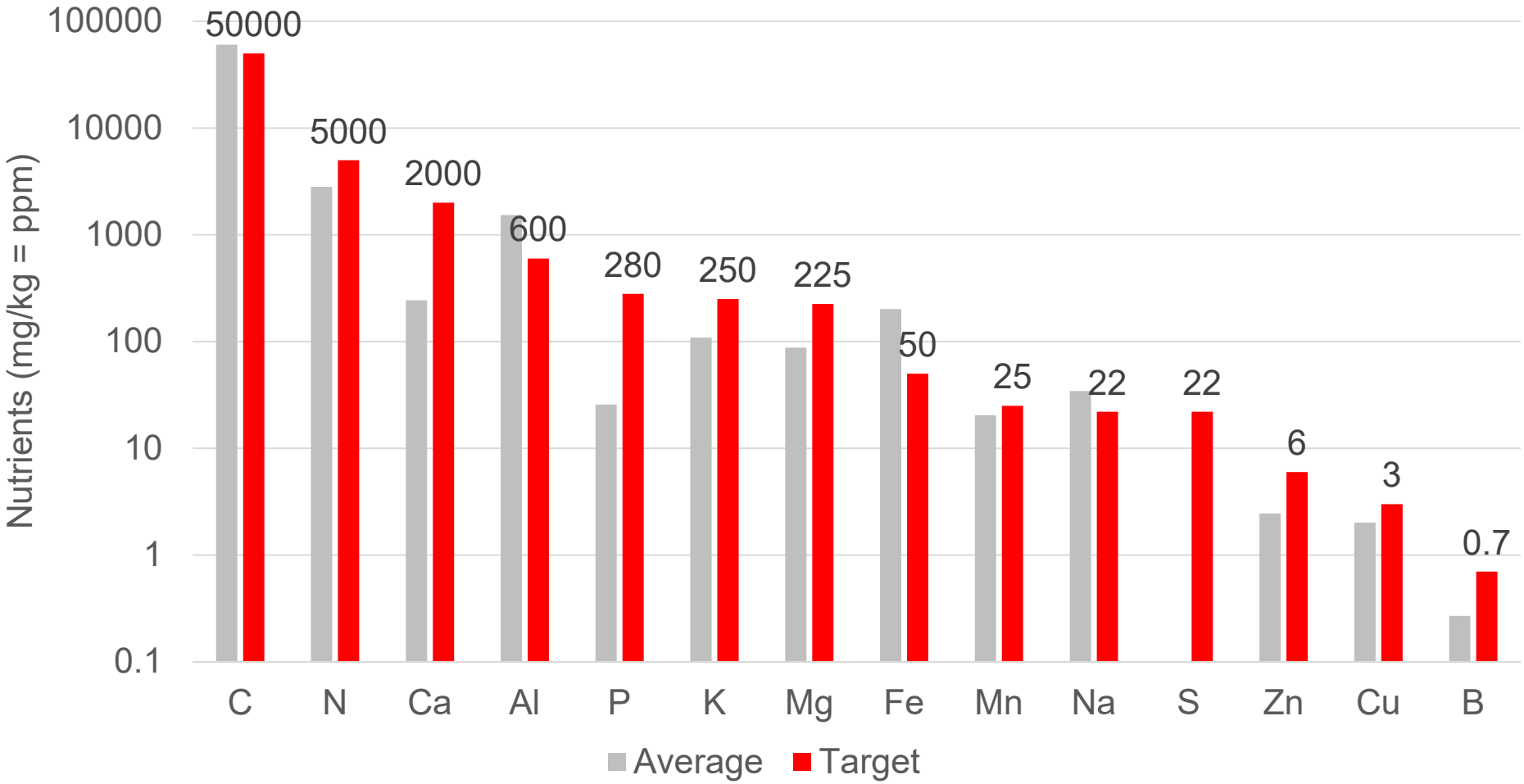
Eg. 1.42% N * (61.7/100) = 0.876 % K

Bown et al 2007: Tree Physiology, 27, 335-

Advance 4 – Identified Mehlich 3 soil extraction analysis method, suitable for forestry, (its widely used in agriculture and a cost effective indicator of soil chemistry)



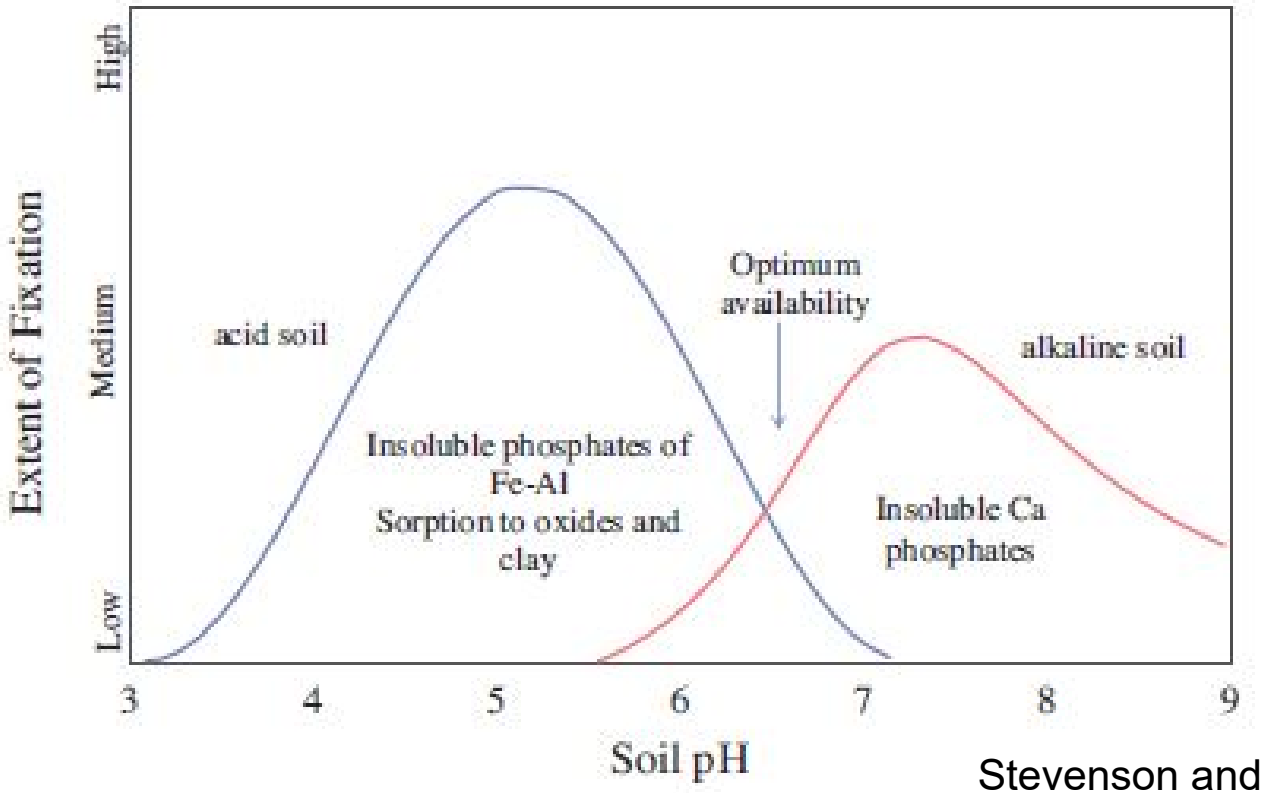
Advance 5 – Identified and recommend soil nutrient targets to better identify limits on growth, an example based on the mid-rotation trials



McKibben W L, 2012: The Art of Balancing Soil Nutrients – a practical guide to interpreting soil tests. Acres USA, 240 pp

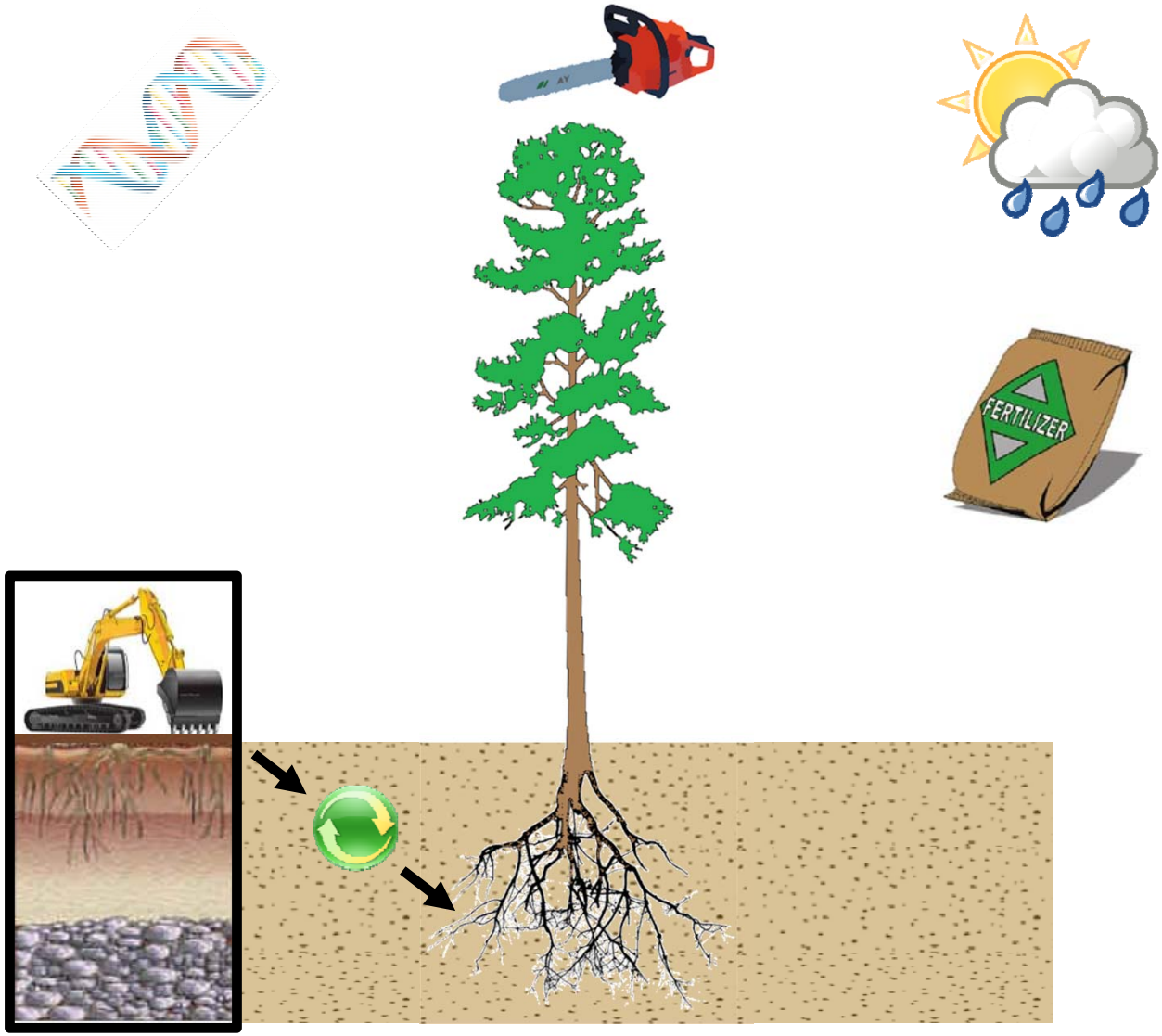
Advance 6 – Improved understanding of the influence of soil pH

- pH is influencing soil phosphorous availability
- Soil microbial activity decreases with acidity
- Cations buffer rapid pH change



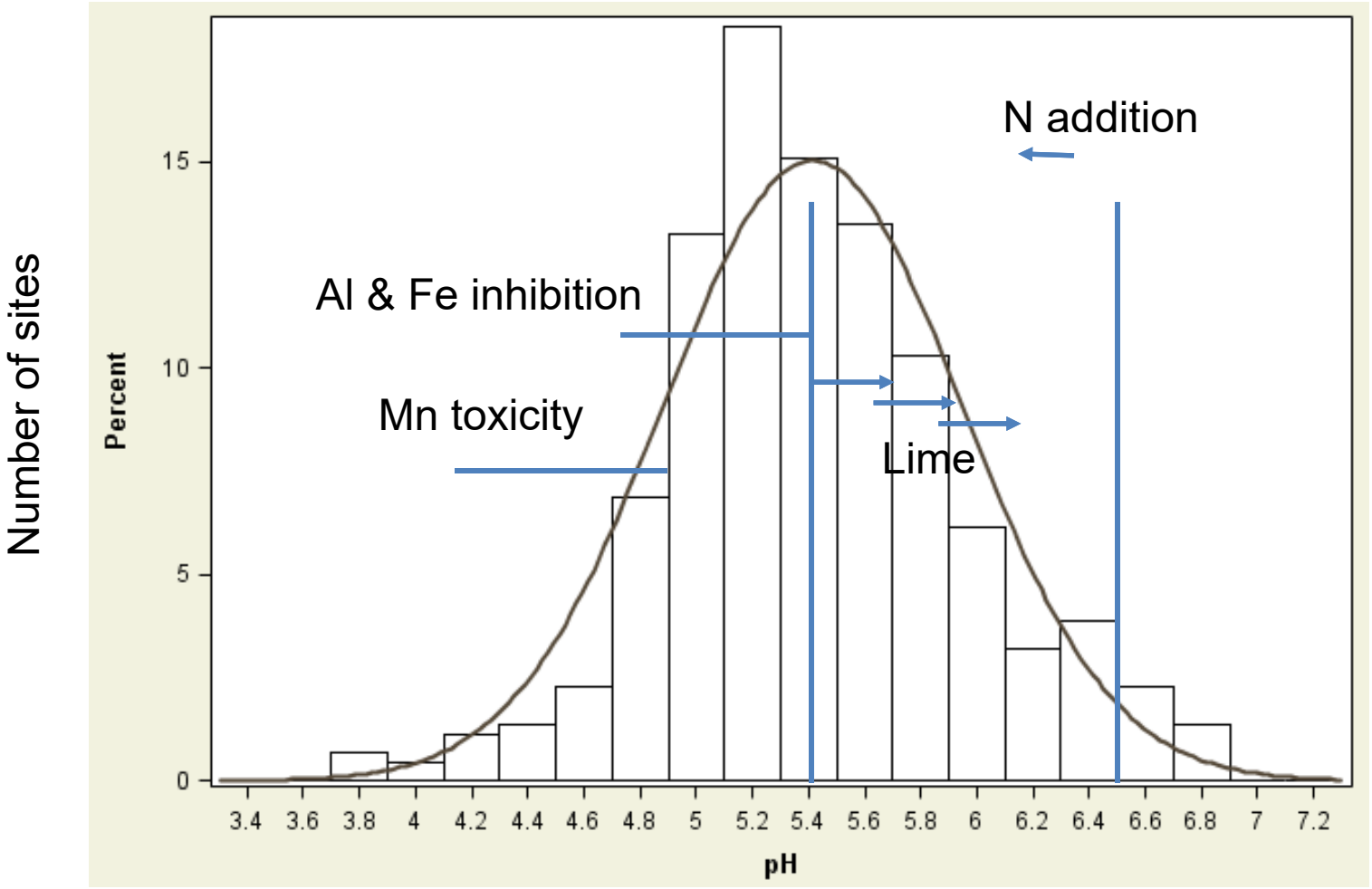
Stevenson and Cole (1990)

Overview – mechanisms for change



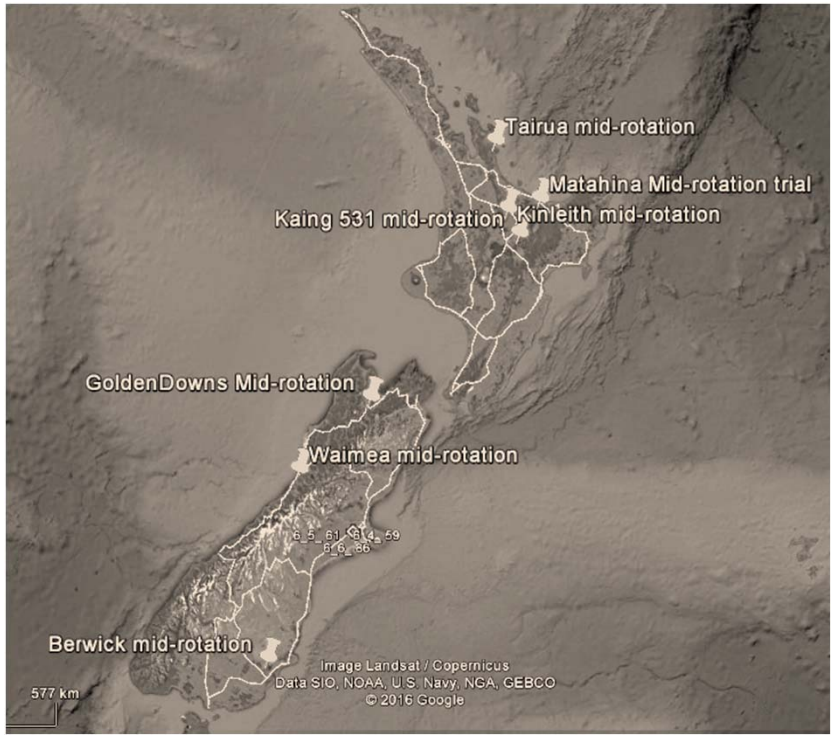
Advance 7 – Improved understanding of sites that are unlikely to respond to granular P fertiliser

- Veritec soils database, sample size 432



How we are taking advantage of these advances

1. Focusing on foliage N & P, because its relevant to all sites across NZ
2. Informing GxE discussion/understanding
3. Improved understanding of nutrient limitations at sites
4. More accessible soils information for management considerations
5. Better target applications and sites
6. Establishing new trials to test our hypotheses



In summary

- Foliage applications of N & P are potentially more efficient than current practices
- Check foliage nutrition in relation to foliar N levels
- Use Mehlich 3 as part of your future soils analyses
- Protect soil pH, because it influences phosphorus availability and lots more

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SCION FORESTS PRODUCTS INNOVATION

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29/03/2017

Thanks to the team: David Henley, Rodrigo Osorio, Tony Evanson, Stephen Pearce, Max Novoselov, Alex Manig, Jessica Shailer, Jianming Xue, Loretta Garrett, Bernadette Nanayakkara, Stefan Gous, Kaye Eason, Forest Industry collaborators and others

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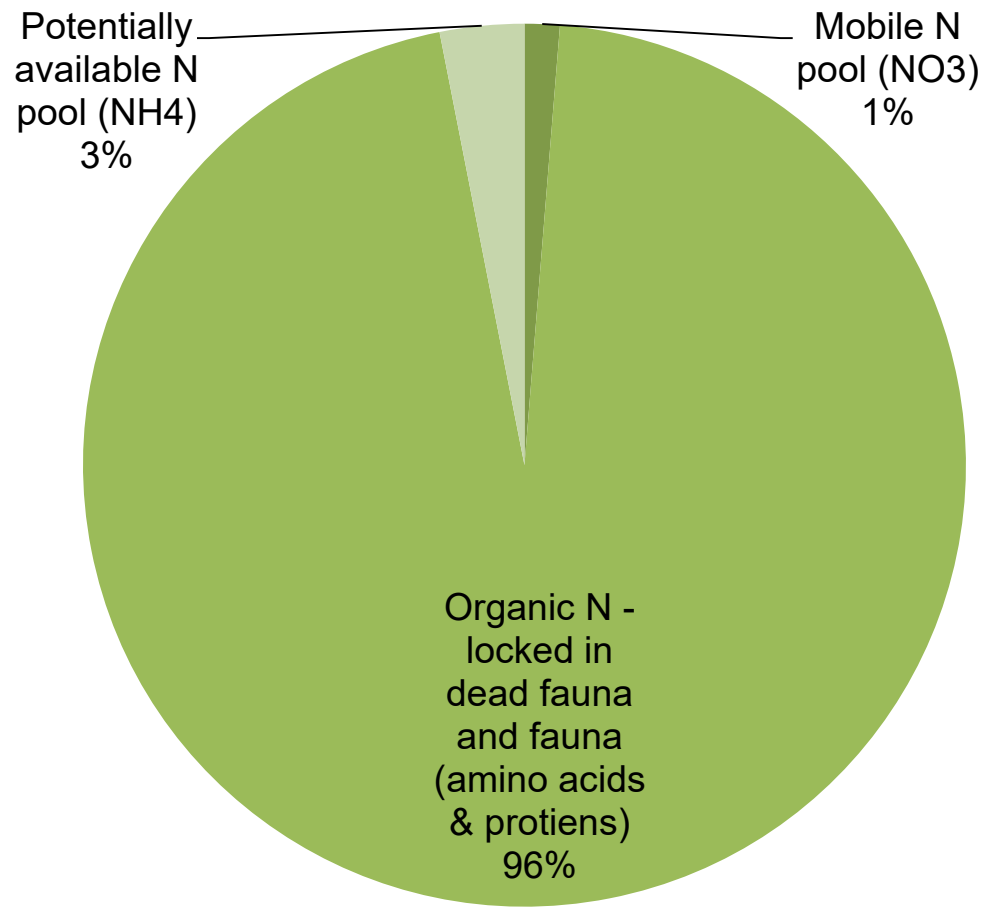
Benefits of foliar applications

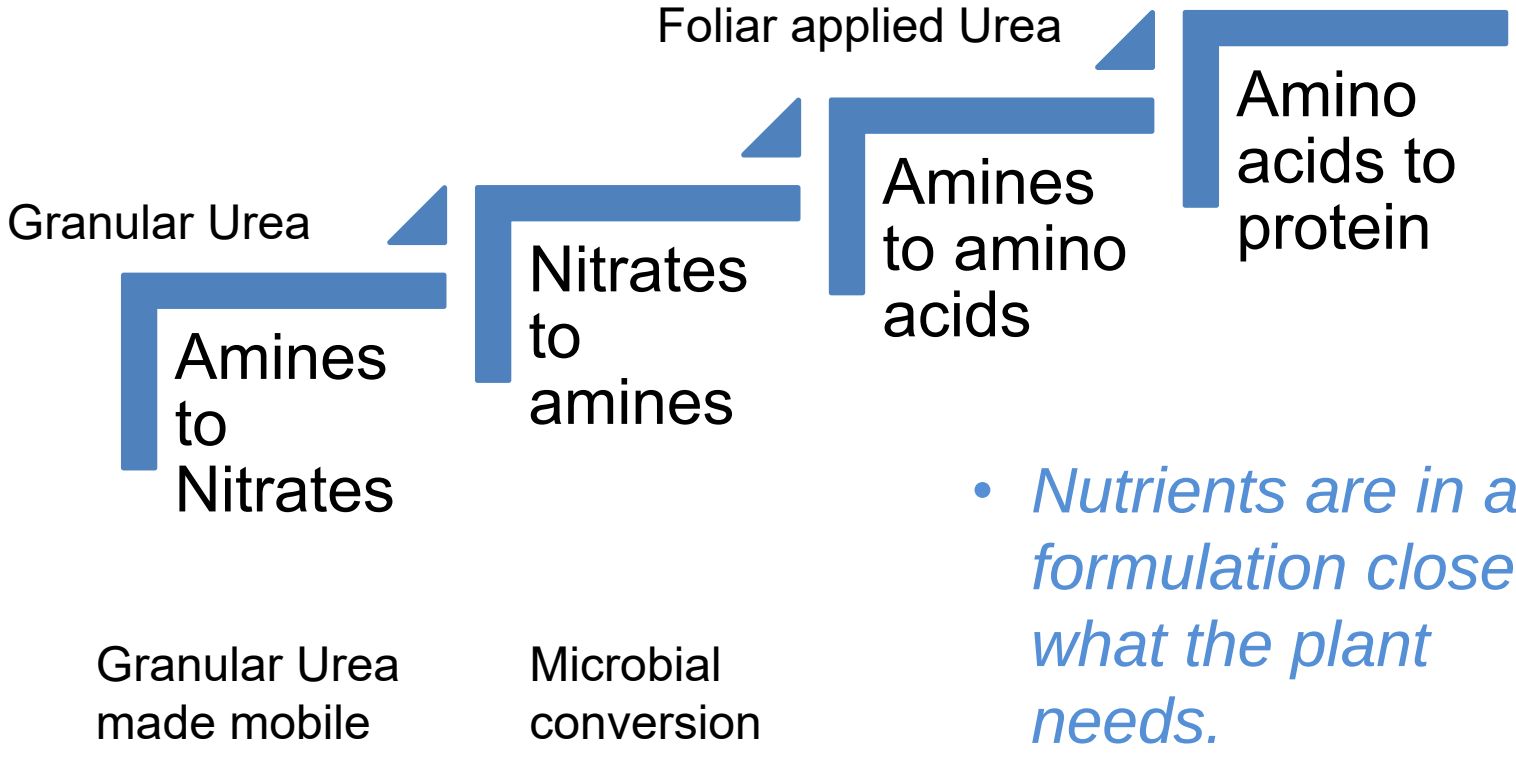
- Target the crop rather than the soil processes

- *Add small quantities of fertiliser relative to the soil nutrient pools for growth gains.*



Benefits of foliar applications

foliar applied N is 10-12% more efficient than granular applied Urea because less plant energy is required



- *Nutrients are in a formulation closer to what the plant needs.*