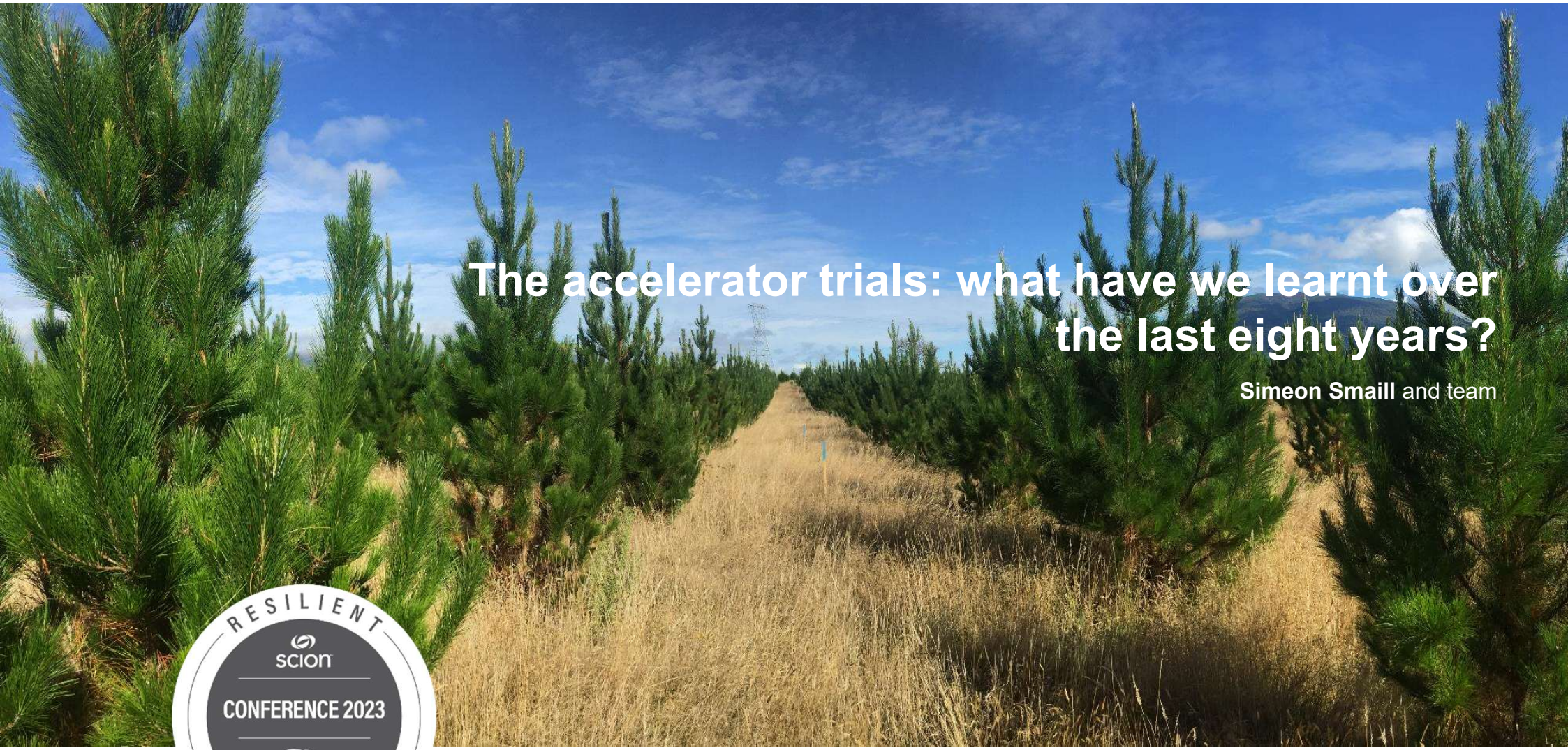


The accelerator trials: what have we learnt over the last eight years?

Simeon Smaill and team

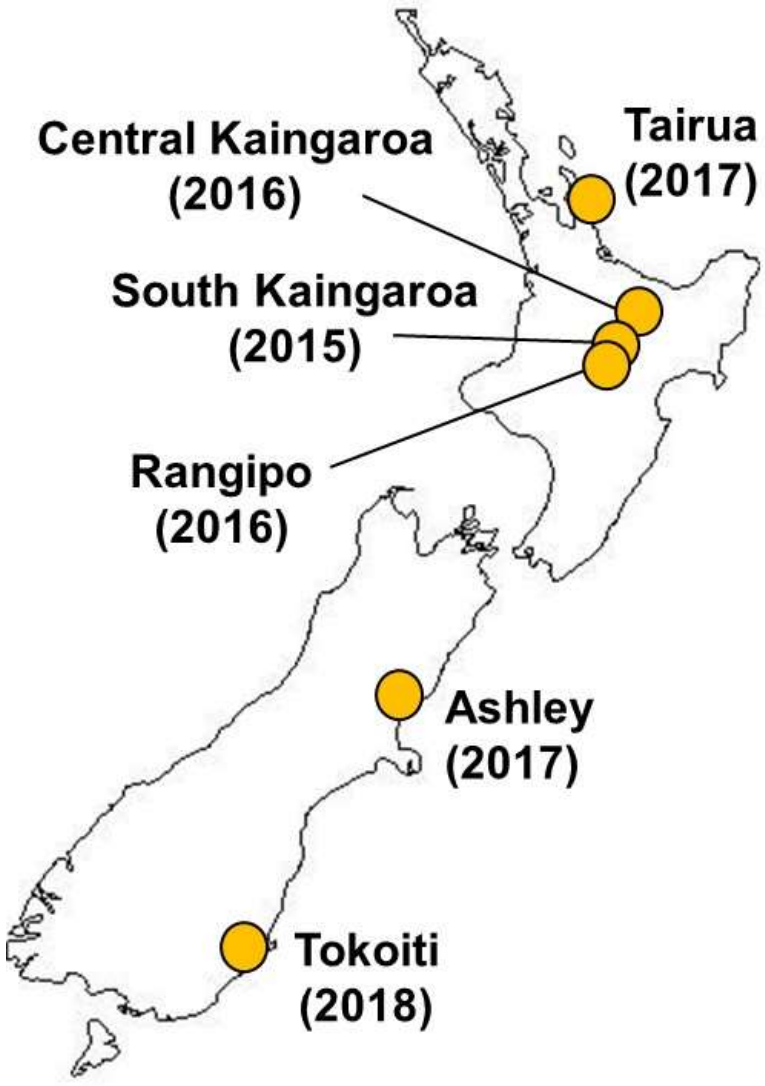
RESILIENT FORESTS CONFERENCE 2023 SCION

FOREST GROWERS RESEARCH

Resilient Forests Research Programme

Accelerator Trials – history

- The Accelerator Trials were established to support the target of sustainably increasing productivity
- Originally planned for five sites, but industry support allowed the creation of a sixth site
- Guiding concept – improve the current tree crop **AND** the site



Accelerator Trials – locations

- Each site had a limitation to overcome, or presented an opportunity to do better
  - Based on existing knowledge and modelling

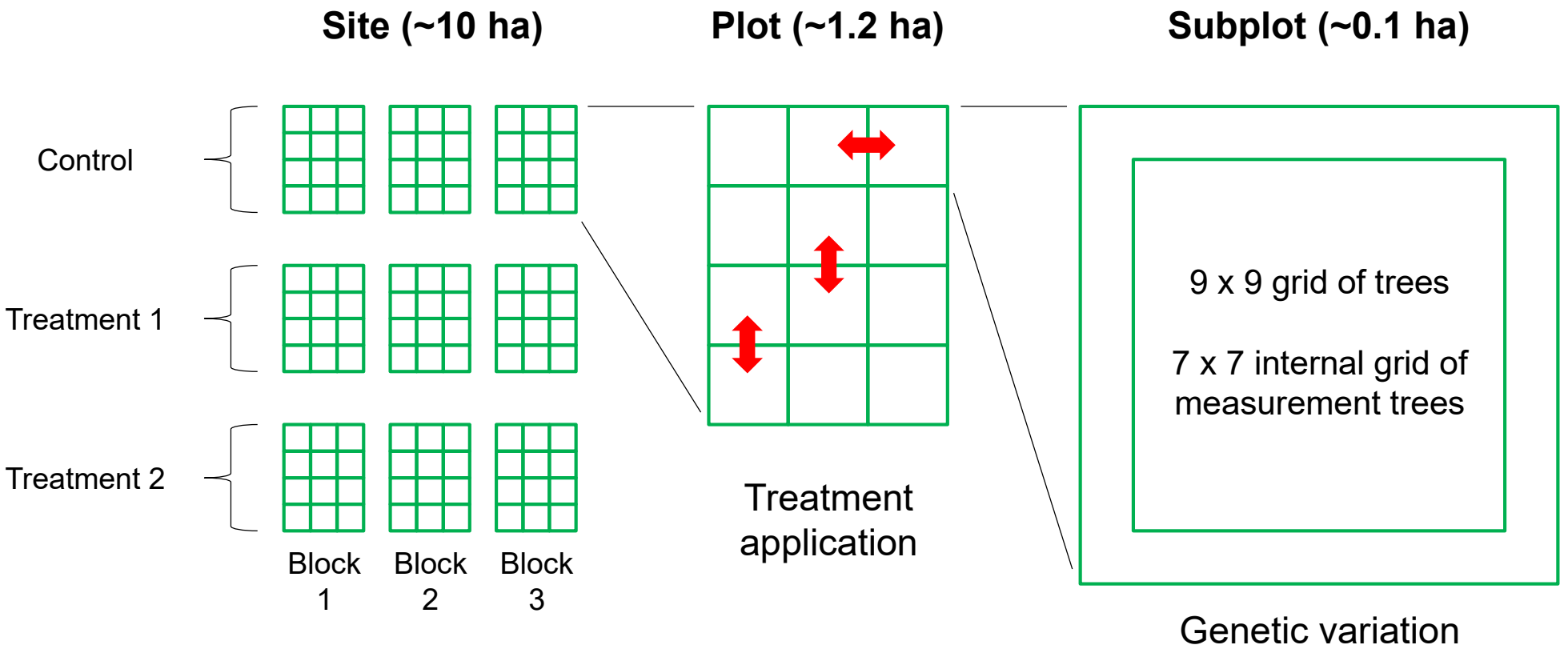
- Pragmatism
  - Had to be suitably representative to be useful
  - Had to be big enough area to fit a trial site

Accelerator Trial – design and scale

- The Accelerator Trials are large, enabling confidence in the data they produce

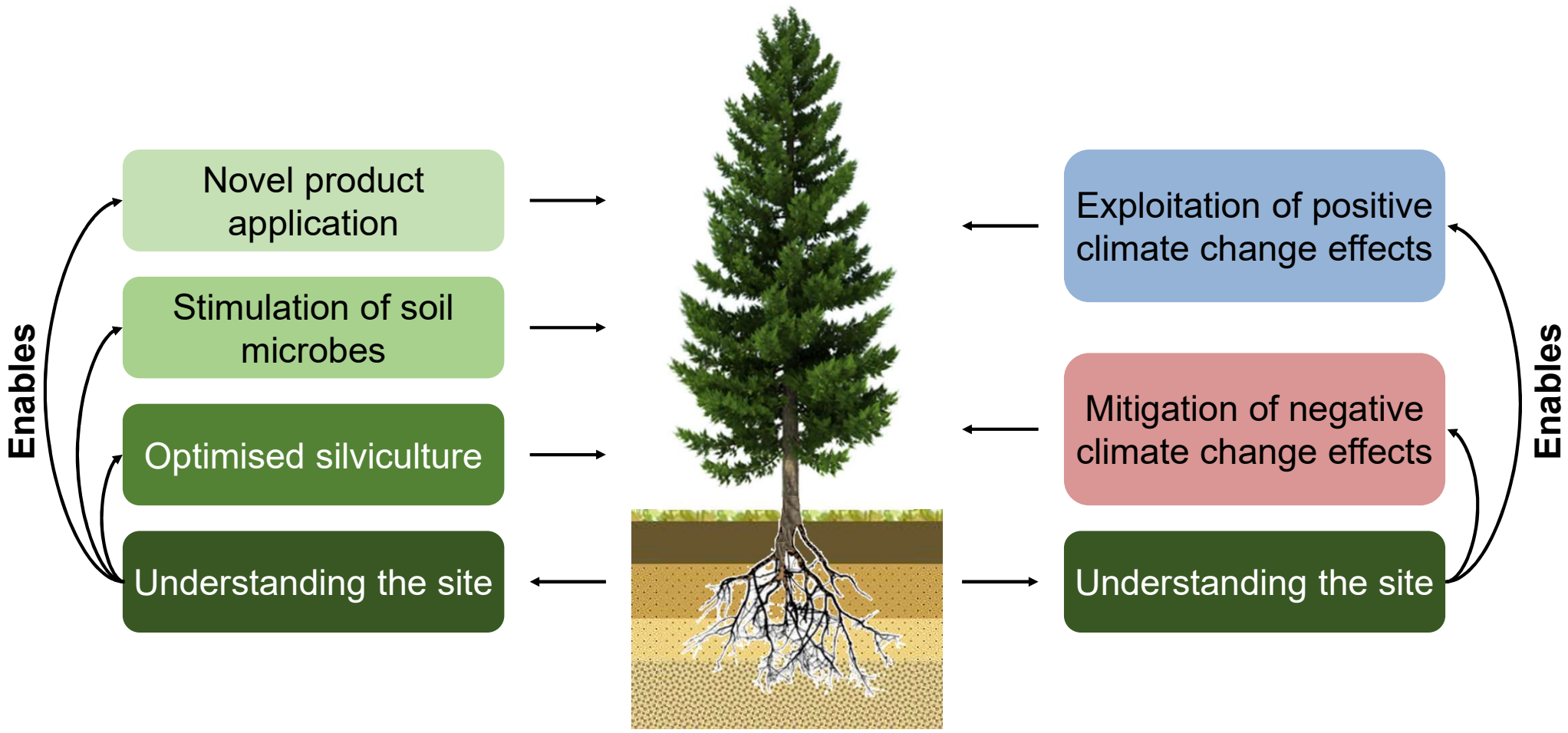
- Many lessons were learnt from the LTSP I trials series
  - cannot split treatments too finely
  - need to be established with a large number of trees so we have worthwhile numbers per plot by the end of rotation

Accelerator Trial – design and scale

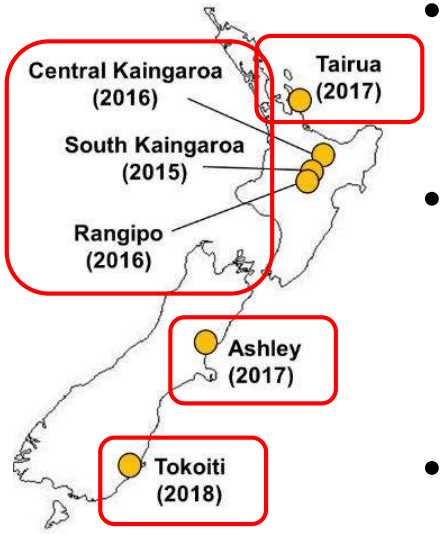


Complicated, but ensures quality data and a return on our investment

Understanding the sites – essential initial work

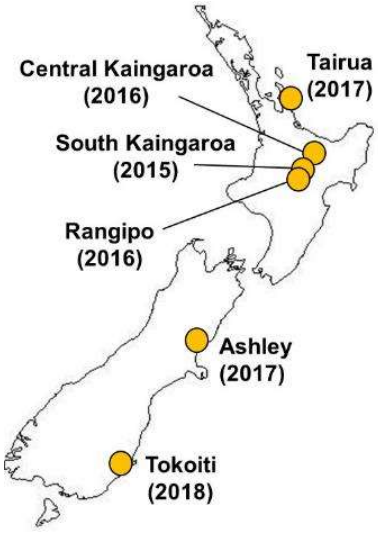


Genetics – lessons so far



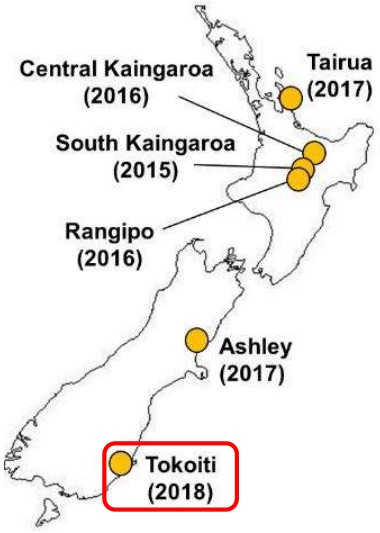
- Caveat – all sites are relatively young, so genetic variation is indicative only at this stage
- Clear opportunities for clonal stock to improve growth and decrease variability in the central North Island area
  - Clone 31 is the standout so far, avoid the attenuata hybrid
- Initially the attenuata hybrid was doing well at the dry Ashley site
  - Recent wet conditions has allowed other stock to overtake it
  - Data indicates hybrid is better prepared for future drought
- Two clones are performing very well at the P limited Tairua site
  - One is of particular interest as it is poor elsewhere; P efficient?
- At Tokoiti one clone is outperforming all other stock

Genetics – overall messages



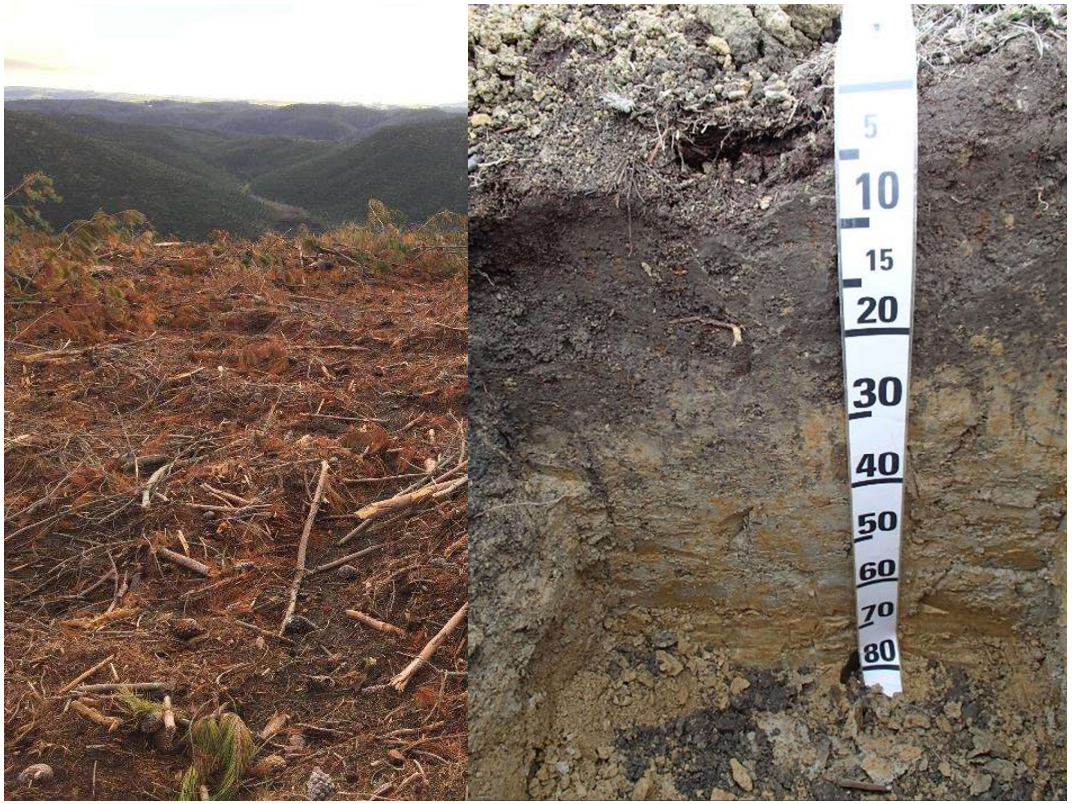
- Site specificity matters somewhat less than we anticipated, but it still matters
- GF19 is still a good option – in the top half at all sites in terms of standing volumes
- Need to undertake assessment of form and wood properties to fully understand outcomes for productivity
- Need to undertake plot level nutrient analysis to fully understand outcomes for sustainability

Treatments – Tokoiti



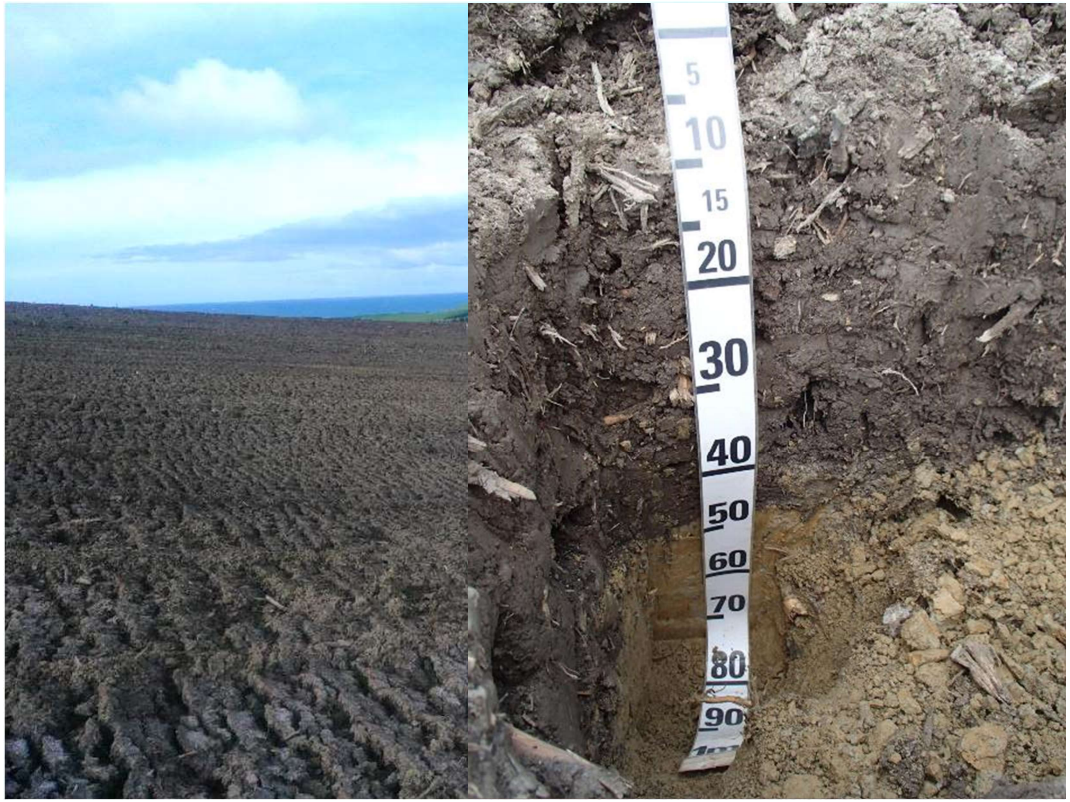
- Productive site that is projected to encounter moisture limitation in the current rotation
  - Shallow depth of rooting due to soil properties
- Significant site modification to increase soil depth and break soil layers
  - Also incorporated mulching of harvest residues

Treatments – Tokoiti



Before mulching

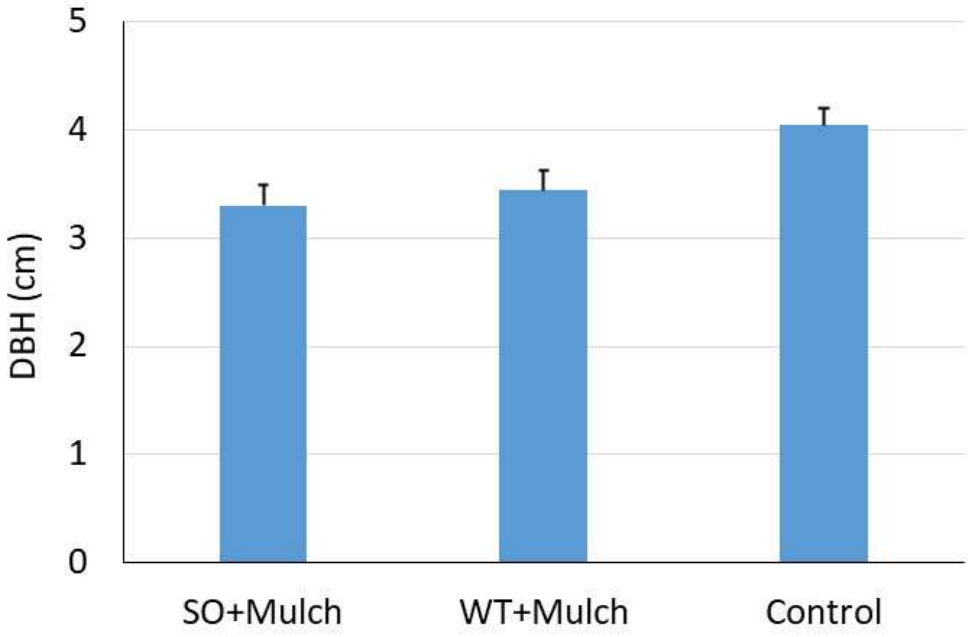
After mulching



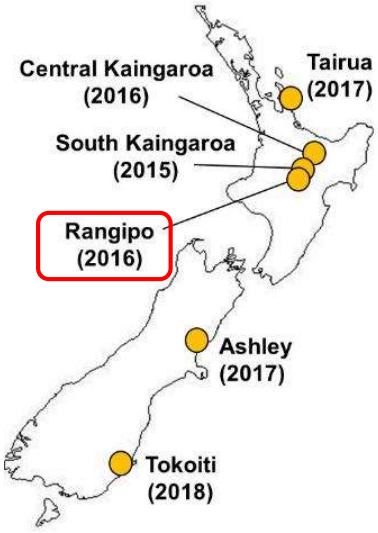
Treatments – Tokoiti

- Growth difference was greater in previous years
  - Trees in treated soils are now catching up

- Created an exposed environment
- Have seen negative effects for current crop – 2022 growth data

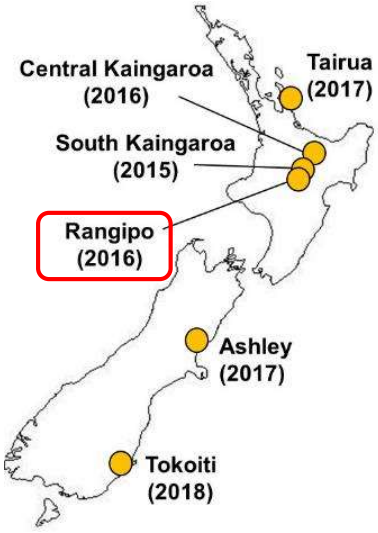


Treatments – Rangipo

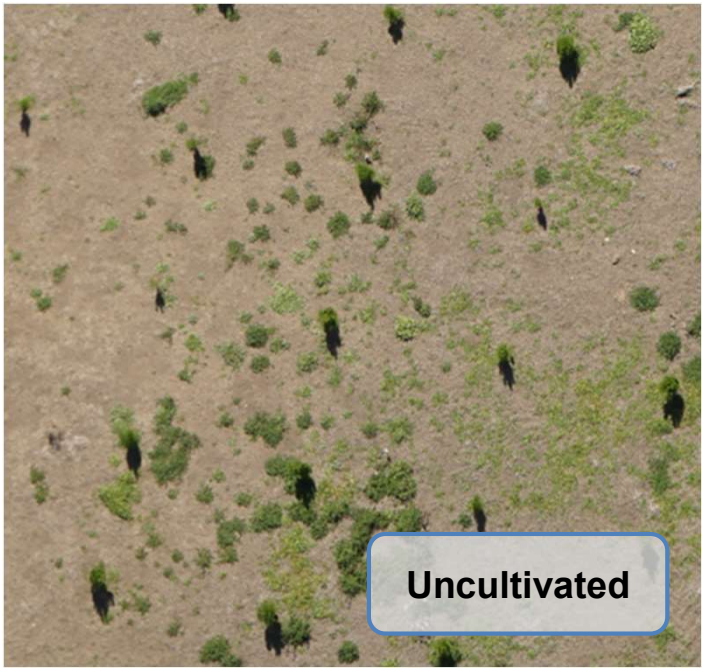


- Ex-farm site; key issue is how to make the most of improved soil
  - Two stocking rates (833 and 1282 sha)
  - No cultivation vs ripped

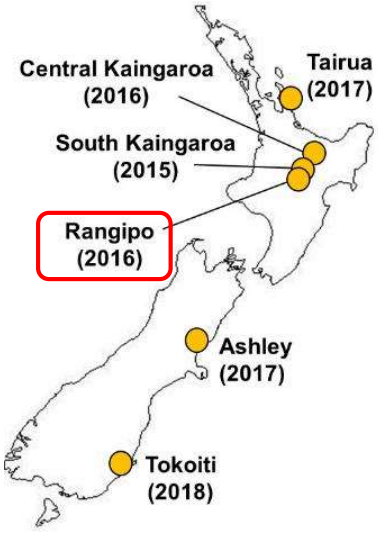
Treatments – Rangipo



- Site is able to support greater stocking rate – 28% gain in volume at 1282 stems ha^{-1}
  - No impact on individual tree metrics
- Ongoing impact of cultivation – 13% loss in volume with ripping

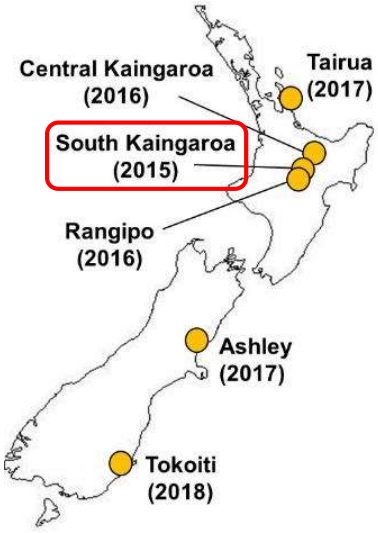


Treatments – Rangipo



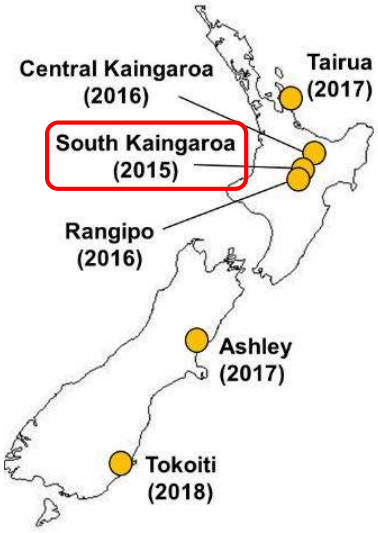
- Recent wind damage to the trial
- Starting work to determine if the genetics and site treatments affected wind stability
- Remote and on-ground data collection
- Integrate tidy up into thinning

Treatments – Southern Kaingaroa

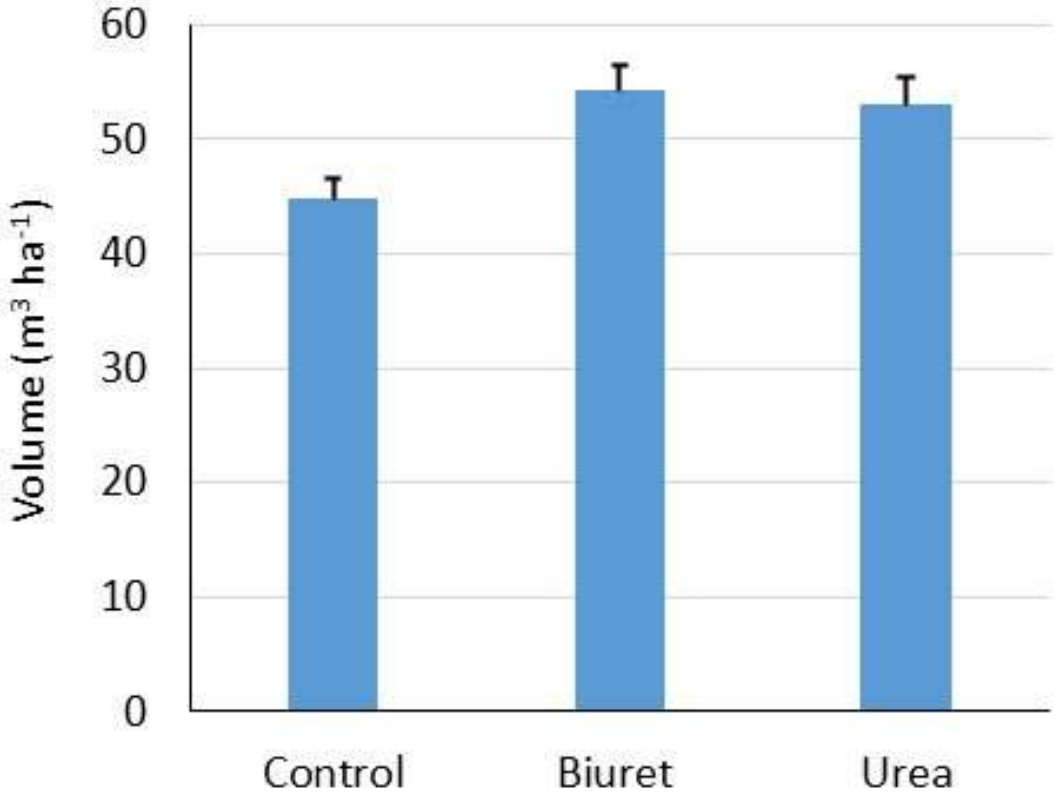


- Low nitrogen site; poor needle retention and minimal litter layer

Treatments – Southern Kaingaroa

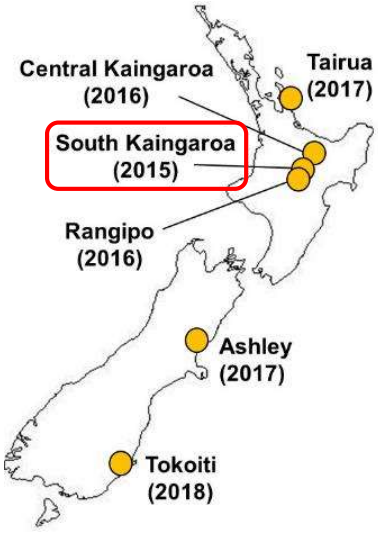


- Used NuBalM (Nutrient Balance Model) to direct additions of nitrogen as urea and biuret at a 40th of the dose rate

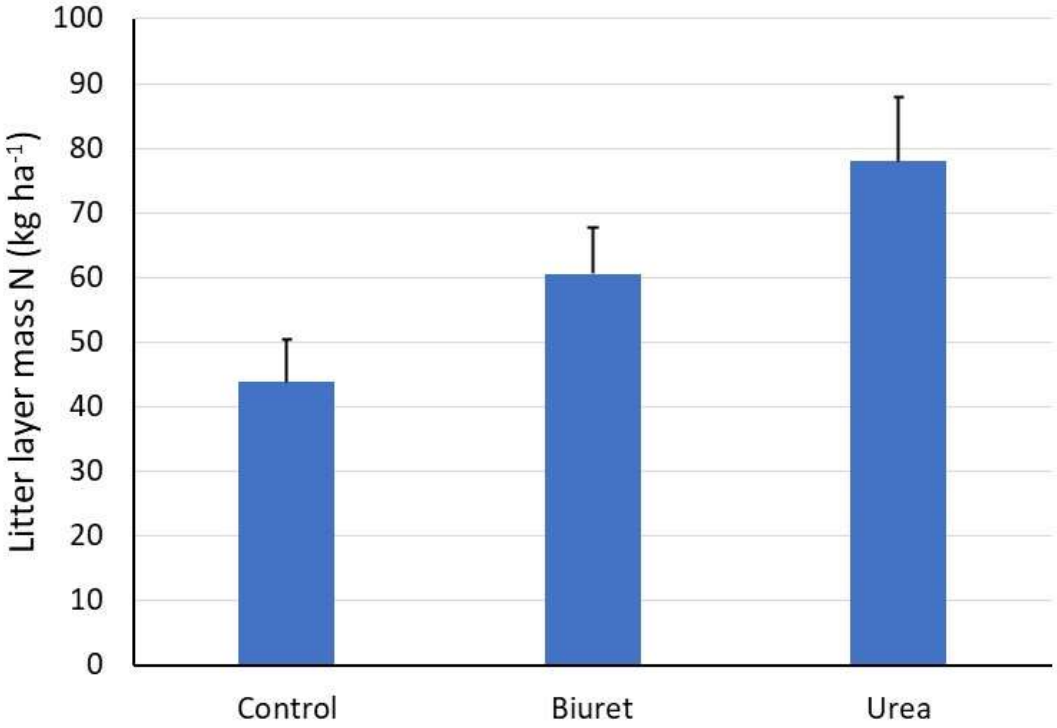


- Treatment response at age six
- Initially, biuret supported greater growth, but urea has now caught up
- Need to consider impact on site nitrogen pools

Treatments – Southern Kaingaroa



- Litter layer properties – are we improving the site?



- Increasing the litter layer mass is a key target for sustainable gains
- Increasing the litter N pool indicates the site has been improved for future rotations

Summary

- We have demonstrated the potential to improve both the current tree crop and the site through our treatments

- At other sites the treatments have not yet had an impact, but at the least we have novel data on the performance of the different genetics
  - provides new opportunities to better match genotypes to sites

- Opportunities to test pathways to lock in or extend the productivity gains through thinning and mid-rotation management strategies are now on the table

- These trials have given us good value to date – and will become even more important to our attempts to mitigate future climate risk

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