

Flood recovery
TECHNICAL FIELD DAY
WINTER 2023



Supported by:



Presented by:



Friday 21st July 2023

9:00	COFFEE	
9:30	Introduction	
9:35	Overview from Stu Kilmister and Phil Kilmister	
10:00	Session 1	Topic 1. Assessing Soil and tree health
10:40	Session 2	Topic2. Pruning Strategies
11:20	Session 3	Topic 3. Dormancy Breaker strategies
12:00	Session 4	Topic 4. Challenging the norms to lower the cost of production
12:30	BBQ LUNCH – Thanks to Fruited	



TOPIC. 1 Assessing soil and tree health

Presented by: Steven Trolove, Ian Horner - PFR

Mike White, Fruition

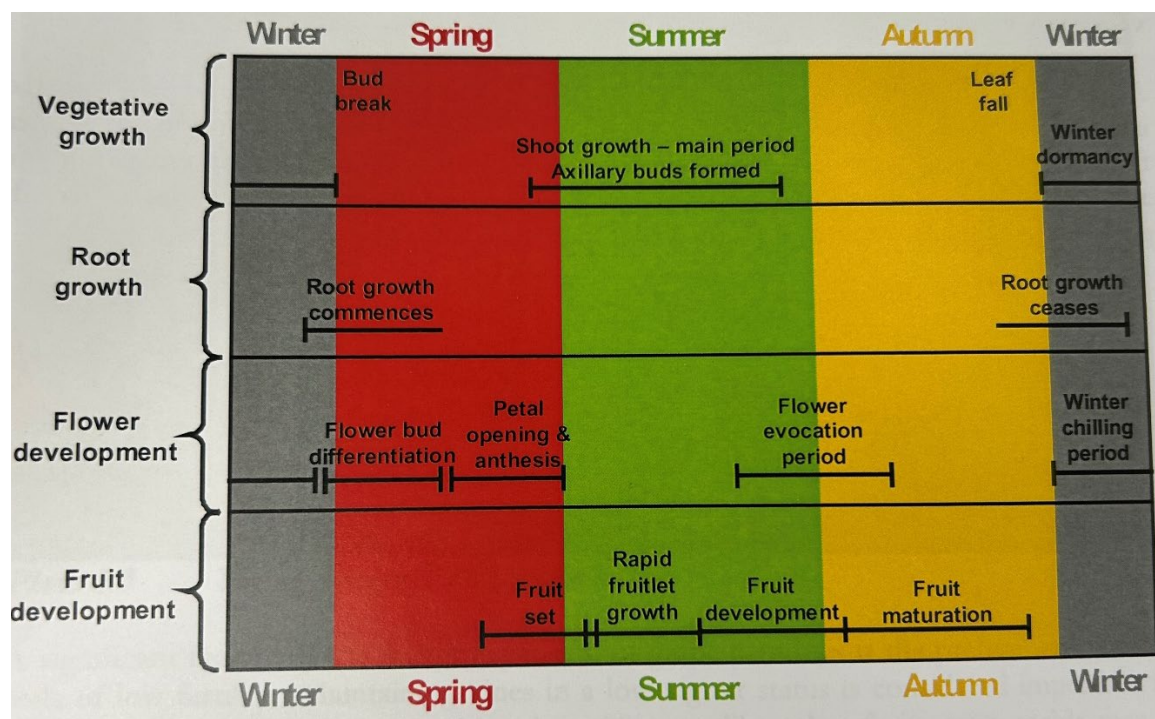


FRUITION

The effects of flooded and saturated soils on tree health and performance are difficult to predict and make orchard management decisions for next season difficult. The following approaches are offered as a guide for assessing and managing flood affected blocks. These same approaches can be applied to blocks which have had prolonged saturated soils.

Tree response to root damage:

To understand how trees respond when their root systems are impaired it's important to understand when plant parts grow. Root flush starting in late winter/early spring will be critical to tree performance this season. Early development of new leaves, flowers and fruit must be supported from carbohydrate reserves from last season.



Sustainable Nutrient Management in New Zealand Agriculture, 2013

- Compacted layers and poor drainage will adversely affect soil conditions and create ongoing tree health problems.
- If roots are damaged, the below ground 'engine' will not fully 'power' the above ground canopy. Roots die if anaerobic conditions continue for too long.
- Tree growth and development will be abnormal where root systems are damaged. Bloom density may be high but subsequent fruit set and leaf area development may be poor. Cautious thinning strategies should be considered.

Don't guess – monitor blocks above and below ground.

Above-ground responses to flooding and saturated soils will start to become evident from green tip on, with delayed or uneven budbreak or collapse in stressed trees.

However, you can start checking below ground now and in early spring as root growth begins to get an early 'read' on the situation. Check 'good' or 'unaffected' blocks first, so you have a baseline for comparison.



Kilhaven – Block L4 B Jugala. Flooded briefly and high-water table. Sandy soil with good drainage, white root growth visible. Likely this block will bounce back reasonably well with a good season



Kilhaven – Block A3 P.Queen. Flooded briefly and saturated soil with poor drainage, very few feeder roots, mottled patterns showing a lack of oxygen. Blocks with this profile are more at risk.

A spade should be a key decision maker to identify:

- drainage issues and compacted zones.
- root health.

Practical decisions

Assess root health in each block – are roots white and healthy inside when cut. Are there healthy new white tips?

Assess soil health in each block – are there compacted zones that could be fixed with ripping or mole ploughing?

Monitoring drains – are they flowing? If not, can they be fixed?

Phytophthora management:

- Removing excess water is key – drainage, ripping etc.
- Reduce load on stressed trees.
- Watch for collar rot lesions at the soil line.
- Consider phosphite treatment in spring (discuss with supplier regarding residues).

Canker management: – check often and remove.

Nutrition considerations:

- Soil test now.
- Leaf test in spring.
- Apply pre-bloom foliar boron to promote fruit set-in at risk blocks.
- Side dress nitrogen for at risk trees in spring based on leaf nitrogen tests.

Overall soil fertility has not been materially changed by the flooding event.

July 2022

Sample Name: A Sub				Lab Number: 3024828.1		
Sample Type: SOIL Apple (S51)						
Analysis		Level Found	Medium Range*	Low	Medium	High
pH	pH Units	6.2	5.8 - 6.8	<div><div></div></div>		
Olsen Phosphorus	mg/L	35	30 - 60	<div><div></div></div>		
Potassium	me/100g	0.68	0.50 - 1.00	<div><div></div></div>		
Calcium	me/100g	8.9	6.0 - 12.0	<div><div></div></div>		
Magnesium	me/100g	1.31	1.00 - 3.00	<div><div></div></div>		
Sodium	me/100g	0.06	0.00 - 0.50	<div><div></div></div>		
Potassium	%BS	4.7	2.5 - 4.0	<div><div></div></div>		
Calcium	%BS	61	60 - 80	<div><div></div></div>		
Magnesium	%BS	9.0	7.0 - 15.0	<div><div></div></div>		
Sodium	%BS	0.4	0.0 - 5.0	<div><div></div></div>		
CEC	me/100g	15	12 - 25	<div><div></div></div>		
Total Base Saturation	%	75	60 - 85	<div><div></div></div>		
Volume Weight	g/mL	1.00	0.60 - 1.00	<div><div></div></div>		
Potentially Available Nitrogen (15cm Depth)*	kg/ha	70	100 - 150	<div><div></div></div>		
Anaerobically Mineralisable N*	µg/g	47		<div><div></div></div>		
Soil Sample Depth**†	mm	0-150		<div><div></div></div>		
Soil Type**†		Sedimentary		<div><div></div></div>		
MAF Units		K 14	Ca 11	Mg 29	Na 3	

July 2023

Sample Name: Kilhaven 5-20cm Mixed 150mm				Lab Number: 3284942.8		
Sample Type: SOIL Arable (S56)						
Analysis		Level Found	Medium Range*	Low	Medium	High
pH	pH Units	6.5	5.7 - 6.2	<div><div></div></div>		
Olsen Phosphorus	mg/L	40	20 - 30	<div><div></div></div>		
Anion Storage Capacity*	%	19		<div><div></div></div>		
Potassium	me/100g	0.55	0.30 - 0.60	<div><div></div></div>		
Calcium	me/100g	9.4	5.0 - 12.0	<div><div></div></div>		
Magnesium	me/100g	1.28	0.60 - 1.20	<div><div></div></div>		
Sodium	me/100g	0.07	0.00 - 0.30	<div><div></div></div>		
CEC	me/100g	14	12 - 25	<div><div></div></div>		
Total Base Saturation	%	81	50 - 85	<div><div></div></div>		
Volume Weight	g/mL	0.97	0.60 - 1.00	<div><div></div></div>		
Sulphate Sulphur	mg/kg	9	10 - 20	<div><div></div></div>		
Extractable Organic Sulphur	mg/kg	< 2	12 - 20	<div><div></div></div>		
Soluble Salts (Field)	%	< 0.05	0.05 - 0.30	<div><div></div></div>		
EC (in 1:5 Extract)	mS/cm	0.01		<div><div></div></div>		
Ammonium-N*	mg/kg	1		<div><div></div></div>		
Nitrate-N*	mg/kg	1		<div><div></div></div>		
Mineral N (sum)*	mg/kg	3		<div><div></div></div>		
Organic Matter*	%	3.3	7.0 - 17.0	<div><div></div></div>		
Total Carbon	%	1.9		<div><div></div></div>		
Hot Water Extractable Organic Nitrogen*	mg/kg	82		<div><div></div></div>		
Potentially Mineralisable Nitrogen*	mg/kg	80		<div><div></div></div>		
Dry Matter*	%	81.9		<div><div></div></div>		
Moisture*	%	18.1		<div><div></div></div>		
'Total' Phosphorus	mg/kg	694	700 - 1600	<div><div></div></div>		
Sample temperature on arrival*	°C	6		<div><div></div></div>		
Base Saturation %		K 3.9	Ca 67	Mg 9.1	Na 0.5	
MAF Units		K 11	Ca 11	Mg 28	Na 3	

TOPIC. 2 Pruning Strategies

Presented by: Jonathan Brookes – AgFirst

Jack Hughes - Fruition



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FRUITION

The situation

The unknowns regarding the effects of flooded and saturated soils on tree health make decisions on how to approach next season really difficult.

The following suggestions are made for making pruning decisions on flood or financially affected blocks:

Tree response to 'wet feet' root damage:

- If roots are damaged, the below ground 'engine' will not be able to fully 'power' above ground canopy,
- Tree root to shoot balance needs to be restored,
- 'Harder' rather than 'lighter' pruning will more effectively correct the imbalance by reducing the canopy to root system ratio,
- Partial or 'light' pruning is therefore not considered a good strategy because it does not fix the imbalance and may increase tree stress.

Business decisions

A priority decision that needs to be made is "am I prepared and financed to grow a crop on this block next season?". These calls need to be made on a case by case basis.

They are tough decisions but remember that with some tailwinds like a normal growing season, stronger markets and more favourable forex, returns could bounce back positively.

Pruning Strategy

Prune it properly now

Where the 'grow the crop next season' answer is yes, it makes good financial sense to prune each block well – a dollar spent on good pruning will save more dollars on thinning and increase crop yield and value.

Or hedge it later

Where there is concern that a block may be significantly 'root damaged' and/or finance and confidence is not there, then a 'November hedge' may be a temporary fallback option. Block/s could be left unpruned with a decision delayed until November when tree health and fruit set is evident.

Mechanically hedging soon after fruit drop is compatible with tree physiology. Light penetration into the canopy is improved, vegetative growth response is minimal and fruit bud initiation for the following season is enhanced.

Hedging specification should also be on a case by case basis. More mature blocks with narrower row widths are best suited. While hedging depth can be extended out to 80cm per side for 'retro-fit' blocks, total canopy and yield potential will be reduced where row widths exceed 4m.



Development of block specific pruning strategies that maximise the results and minimise future risk on the overall orchard business.

Kilhaven Orchard specific block goals for 2024

- Early harvest premium orchard – (Moderate crop load - good colour and size early)
- Better light environment (planned reduction in use of reflective mulch)
- Set up for labour efficiency (Platforms / mechanical pruning etc.)
- Sprayer coverage / penetration – Black Spot
- Labour resource availability – (Timeline planning / Skills etc.)

M26 GX – B3 4m x 2m (1250 trees / ha) – M26 planted 2002

- 2020 68T/ha 160g (116 count)
- 2021 85T/ha 150g (124 count)
- 2022 77T/ha 140g (133 count)
- 2023 75T/ha 165g (113 count) - Estimate
- 2024 Target - 75T/ha 165g (113 count)
- 2 buds per harvested fruit = 725 buds per tree post pruning –(variable trees)
- Impact of flooding (silt / drainage / ground conditions)
- Variety block specifics. (Vigour, timing, financial priority)
- Impacts of under or over pruning – Flow on implications (vigour, chem thinning...)
- Development of the strategy – What are the rules to pruners?

Large branch removal? Level of detail required? Specific areas of focus within the tree? Winter fruit buds? Timing of Pruning?

PQ B2 – 3.6 x 1.8m (1543 trees / ha) – CG 2020 planted 2010

- 2020 72T/ha 260g (71.5 count)
- 2021 88T/ha 200g (93 count)
- 2022 71T/ha 205g (91 count)
- 2023 75T/ha 220g (85 count) - Estimate
- 2024 Target - 75T/ha 220g (85 count)
- 2 buds per harvested fruit = 425 buds per tree post pruning
- Impact of flooding (silt / drainage / ground conditions)
- Variety block specifics. (Vigour, timing, financial priority)
- Impacts of under or over pruning – Flow on implications
- Development of the strategy – What are the Rules to pruners?

TOPIC. 3 Dormancy Breaker Strategies

Presented by: Chris Herries - Horticulture

Gary Speers – Fruitfed Supplies



Introduction

Dormancy Breakers are an amazing management tool, that we all have become use to using as part of the management on our blocks for a range of reasons including, harvest management, bloom compression to reducing Fireblight exposure, chemical thinning compression. With the current situations following Cyclone Gabrielle and the levels of damage out there is some questions being asked about whether the use of a dormancy breaker is a good idea. Hopefully we will answer some of those questions.

Plant Stress

The first thing to try and establish is what is the damage to this block, and this will vary from orchard to orchard but also block to block on the property. The dormancy breakers have warning on their labels like “***apply to healthy trees, not under stress.***” Of course, the first question at this point is how do you quantify the stress in the block. This is difficult and we just need to work with what we know.

- To start look at floral buds and determine their health.
- Use a pocketknife and check the health of the rootstock and scion wood by removing the top layer and check for a fresh green appearance.
- Talk with others - assess the amount of time the block has had surface water covering the ground.
- How wet has the old topsoil layer where the tree roots are located been over the past 5 months.



Floral buds are dead

Coverage



Trash

On a lot of blocks there is different levels of trash hanging up in the canopy. This layer of material is covering the bud scales and the bark on the one-year-old wood, the two key areas that we need to have direct coverage of the dormancy breaker chemistry to contact. So really important if you are going to apply a dormancy breaker is to remove as much of this material prior to application.

Poor coverage will lead to a poor result.

Access

Are we going to be able to spray down the rows at the key time of application. As the ground is just so wet, that we are finding when we are getting 10mm of rain is like having 100mm come down and access with tractors and sprayer on many blocks, is still an issue.

What about the use of Helicopters?

Over the years we have experiences where Dormancy breakers have been applied and good coverage has not been achieved, ending with a poor uneven result. Of course there is a wide range of capabilities of different machines and how they are setup. First choice would be to keep away from helicopters for the use of dormancy breakers. If you do chose to go down this path the aim wood be to apply as higher water rate as possible and spray the block twice in two directions, aim at somewhere

between 500-800L/Ha depending on canopy size. Any use of helicopters for the use of dormancy breakers is off label and outside of manufactures recommendations.



Nitrogen

Nitrogen plays a huge role in the process of budbreak. Trees suffering with low nitrogen reserves will impact on both the natural or chemically induced budbreak process. The autumn period is a critical time the trees build up and store away nitrogen for the spring with the orchards being flooded there has been a massive impact on the normal autumn process and in many cases, a huge amount of root death has occurred, resulting in the trees being in a stressed state. This will impact on bud break and supplementary nitrogen applications should be considered.

Dormancy Breakers

Hydrogen Cyanamide (Cyan, Hi-cane, Hi-Break)

This causes a burning of bud scales and hormonal change in the plants tissue. The tree then pulls on reserves of nitrogen stored in the plant so where these levels are low this activity will be impacted and phytotoxicity can occur. Full coverage is essential for a good result.

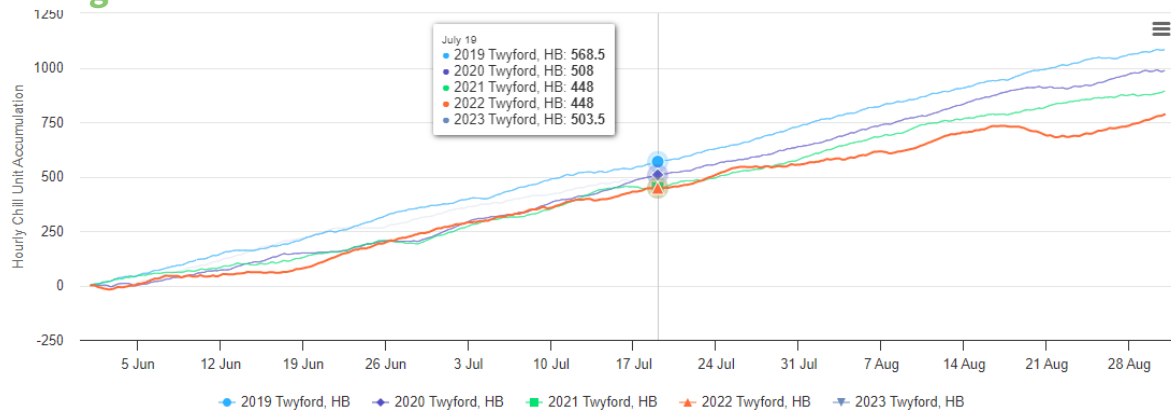
Fertiliser Adjuvant + Calcium Nitrate (Escape, Erger)

With the application of this mix of an adjuvant and calcium nitrate the products are affecting the amount of gibberellins, cytonins, and auxins, and pushing a rush of nitrogen into the system. There are clear warnings on these labels which include the note; ***“DO NOT apply to sick, weak or stressed plants, or those with poor lignification as damage may occur”***. So, case by case the risk on your property to the amount of stress in the trees is a call that needs to be made. More recently the use of half rates has been used on apples, mainly for flower compression, with reasonable results. It is considered that the use of half rates will be less risky if applied to lightly stressed trees. Full coverage is essential for a good result.

Waiken

Mainly used for flower compression Waiken is derived from vegetable oil. It's the softest mode of action of the dormancy-breaking products so negative affects are less likely from this chemistry, although there is a warning on the label to apply to health trees. This is mainly from the view that if the trees are unhealthy, you are unlikely to get adequate plant uptake and the desired effect will be compromised. Full coverage is essential for a good result.

Timing



Certainly we have had some good winter chilling through June this year and currently sitting about the same as 2020 so expectations is that we should get good results this spring from the use of a dormancy breaker. A lot will depend on the weather over the next two weeks. Results are normally poor in low winter chill seasons. With the information to hand at this point, if you were happy with your results from last season then your application date will be a couple of days earlier this season.

Decision Time

Each blocks situation is different, and all parameters need to be taken into consideration, as to how badly affected the block is.

- If the block definitely is showing signs of stress then seriously consider, keeping away from the use of a dormancy breaker this season
- If you know that there is some stress but are confident the trees have come through the previous season only lightly affected, then consider the half rates of Escape/Erger or the use of Waiken
- If you are confident the block has come through unaffected then all your standard options are available.

Please be aware that the manufactures of these products will not endorse the use of their products onto sick, weak or stressed plants. Any use in this situation is at the Growers risk.

Challenging the norms in an attempt to

TOPIC. 4 lower the cost of production

Presented by: Stu Kilmister - Grower

Phil Kilmister - Grower

Len Thompson - Grower

Ross Wilson – AgFirst



Every grower is faced with rampantly increasing costs of production (COP). On top of that background issue, Cyclone Gabrielle destroyed many crops making cashflows extremely tight further adding to the need to look for all ways to operate as cost effectively as possible.

The Kilmisters have been on the road to challenging the norms for a few years now. The key areas or technology they have identified to date include:

1. Mechanical Trimming
2. Platforms
3. Leaf Blower for silt removal
4. Root Pruning
5. Aggressive but prudent chemical thinning

The Kilmisters know that the best way to lower COP per export tce is to grow high crop loads with great export recovery and the right size. We refer to those as the 3 P's (production, packout and price). Any use of new tech to lower cost can't be at the expense of the 3 P's and this sits in their minds with all new tech roll out. Today we will discuss the use of the first 3 bullet points leaving bullet points 4 and 5 to another session.

Mechanical Trimming (MT)

MT has the potential, done well to:

- Lower the cost of winter and summer pruning
- Reduce the need for a lot of branch bending and tying
- Improve light penetration

Is also has the potential to be negative to tree physiology and productive performance if not applied correctly. The Kilmisters and Len Thompson from JAS will discuss their learnings to date with how they implement this technology.

Platforms

With the covid pandemic and a real shortage of orchard labour, many NZ growers invested in platform tech with the primary goal of improving the demographic of staff that could work the trees. Platforms clearly have that advantage but making them achieve a lower COP is another challenge.

The Kilmisters have used different types of platforms over the past few years and have learnt a lot about what works for them and what doesn't. They will share their experiences. One real positive that has been identified is the combination of the platform and pneumatic pruners to efficiently prune the tops of slender spindles.

Leaf Blower

We trailed the leaf blower on a spindle canopy to remove debris and silt. Ross will summarize the results

