Flood recovery
TECHNICAL FIELD DAY
SPRING 2023

New Zealand Apples & Pears®

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Mr APPLE NZ

Presented by:

Horticentre Group | Horticentre TasmanCrop HortFertplus

Plant & Food™ Research Rangahau Ahumāra Kai

AGFIRST

Fruitfed Supplies

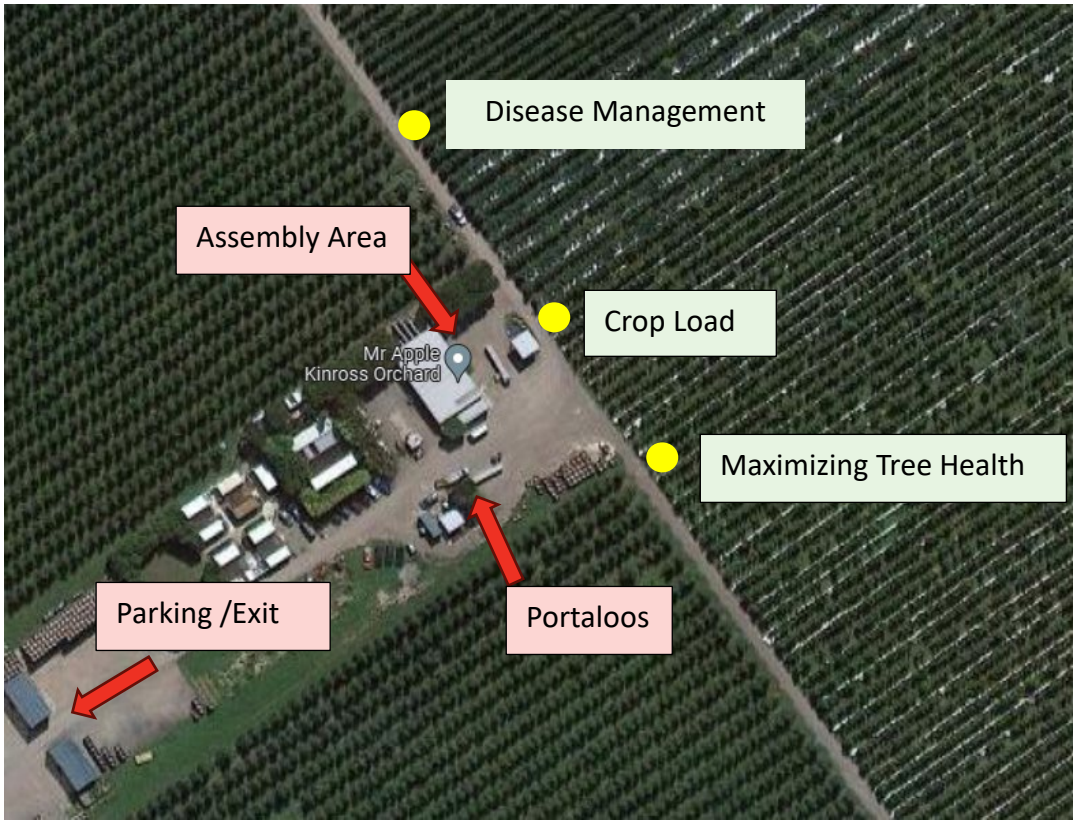
FRUITION Horticulture

Developed: 21 September 2023

Tuesday 26th September 2023

2:30	Apple Juice and Apple Donuts	
3:00	Introduction	
3:05	Overview from Kinross Orchard - Robbie McCormick and Lisa Edgarton	
3:30	Session 1	Topic - **Assessing Tree Health**
4:00	Session 2	Topic – **Crop Loading Targets**
4:30	Session 3	Topic – **Disease Management**
5:00	BBQ – Thanks to Fruitfed	

Location for each topic



Mr Apple – Kinross Orchard Experience

Presented by: Robbie McCormick, Mr Apple

Lisa Edgarton, Mr Apple


PROGRESS
PLEASE USE RAGS FIRST
FOR OIL CHECKS AND
GREASING OF
TRACTORS

Assessing Tree Health

Presented by: Mike White, Fruition
Chris Herries, Horticentre
Robbie McCormick, Mr Apple

The effects of flooded and saturated soils on tree health and performance are still not clear and this means that orchard management decisions need to be based on assessments of the blocks from dormancy on.
The following considerations are offered when approaching these decisions in managing flood-affected blocks. These same approaches can be applied to blocks which have had prolonged saturated soils.

Importance of carbohydrate reserves.

Early development of new leaves, flowers and fruit must be supported from carbohydrate reserves from last season.

- If carbohydrate reserves in flood-affected blocks have been compromised enough, then early-season leaf and flower development could be affected.
- Cautious crop load targets and thinning strategies may be appropriate.
- This has implications for balancing crop requirements, downstream vigour and long-term tree performance.

Monitoring blocks early is critical.

Above-ground responses will become evident from green tip on, starting with delayed or uneven budbreak. Visual assessments of leaf and flowering will inform how best to manage blocks going forward.

- Individual tree death?
- Is the uneven budbreak?
- Is leaf growth normal?
- What does leaf quality look like. Is it patchy, abnormally pale?
- Is flower appearance and development normal.

Context for Kinross Pink lady.

- Flooded for 2-3 days, significant silt deposited.

- **Site**
  - Sand over a silt loam - free draining.
  - Sediment deposited

        - high soil pH (mid 7's), high calcium, high sulphur
        - moderate magnesium
        - low in phosphorus, potassium and organic matter (mineral nitrogen)
    - Trees not harvested and fruit removed in winter.
    - Not an "in favour variety" so might be reworked or replanted after a season, so how much effort should be invested here?
    - Trees were hedged to reduce pruning costs.

- **Management**
    - Budgeted crop target reduced (80% - 4000 TCE)
    - Chemical thinning approach. No primary – will look at quality of leaf, flowers, fruit set and then decide on secondary thinning approach.
    - Solid fertiliser applied in later winter to lift P, K and Mg levels and supply B ahead of season.
    - Application of regalis to improve fruit set.
    - Because of uncertainty of blocks future unlikely to receive any additional nutrients.

Wider nutrient considerations

- Apply pre-bloom foliar boron to promote fruit set-in at-risk blocks.
- Nitrogen foliars are an option for at risk blocks in spring based on visual assessments.
- Leaf test in late spring (November).

Leaf sampling

A plant analysis should include N, P, K, Ca, Mg, Na, S, Fe, Cu, Zn, Mn, and B
Sample 40-50 leaves, taking the youngest fully expanded leaves from non-fruiting laterals of the current season's growth. Leaf samples can be taken from early November, not earlier as nutrient levels will not be stable in young developing leaves.

If there are big differences in the visual appearances within a block then take paired samples for comparison, e.g., healthy vs affected.

Crop Loading and Chemical Thinning Spring 2023

Presented by: Ross Wilson, AgFirst

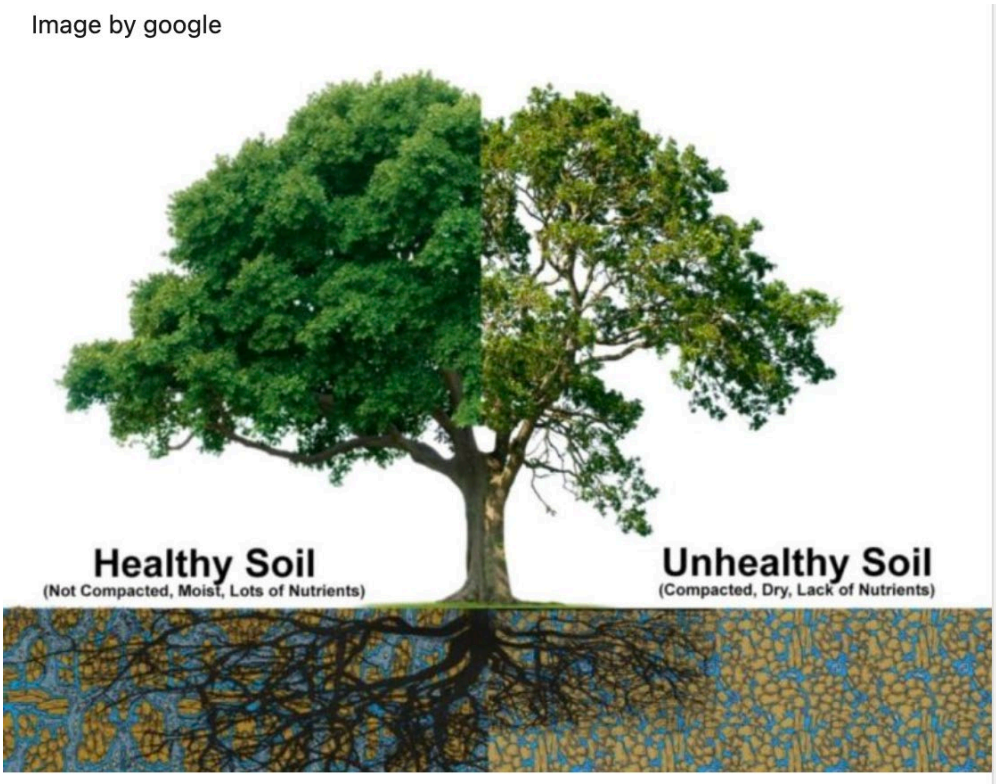
Dr Ben Van Hooijdonk, Plant and Food

Gary Speers, Fruitfed

Lets set the scene

- The ground was waterlogged last year for long periods of time
- Solar radiation levels were some of the lowest on record last year
- Cyclone Gabrielle affected orchards suffered silt loadings and some had long durations of water logging.
- Some blocks did not get picked so trees carried fruit longer than normal.
- Limited post-harvest nutrition was applied due to blocks being inaccessible.
- Some blocks have had minimal pruning due to cashflow constraints therefore bud densities are much higher than normal.
- NIWA and MetService are both predicting a strong El Nino weather pattern which will result in hot and dry conditions.
- Costs of production have continued to increase particularly labour.

Image by google



Kinross

- Sandy loam soil type
- Silt levels were highly variable 0-70 cm and took some time to remove
- 2023 crop was removed very late
- Jazz and Pinks have only been machine trimmed so bud numbers are high

Therefore

- Trees are likely to have reduced root volume
- Lower tree reserves carried over due to low solar radiation and poor root functioning.
- With an ElNino forecast, ensuring the trees are not overloaded will be critical to avoid small sunburnt fruit
- Many blocks will need this year to recover to full health

Within each block you will need to attempt to judge tree health?

- Document any on-off sequence. Was it an on year last year
- Observe bud health ~ some buds are dead already in badly affected blocks
- Observe synchronization of bud break, stressed trees will show prolonged budbreak, and significant variability tree to tree.
- Observe spur leaf size and colour. Cupped leaves not flat
- Small weak flowers
- Bud density per tree, is it high or low?
- Flower clusters per tree particularly marginal blocks
- Fruit clusters per tree particularly marginal blocks

Fruit Set characteristics spring 2023

Where trees have poor root health and low reserves, we expect natural drop will be higher in spring 2023. Flowers may be present, but they might be weak and ovule longevity may be shorter.

- Trees will have reduced root systems, lower reserves and will perform differently this year.
- Profit margins of many varieties are slim and can't afford large hand thinning bills.
- Some varieties you may be better to slightly risk over thinning e.g., Gala strains, Jazz, Kanzi, standard Fuji, Rose,
- High margin varieties we need to be a bit more conservative to ensure the trees carry their optimum crop e.g., JuGala, Rockit, Dazzle, Envy, Red Sonya, Ambrosia etc.
- Low biuret foliar Urea may be useful if n levels are low (5kg per ha, 2-3 x pre full bloom)
- Recognize previous plant deficiencies and address nutritionally.
- Increase beehive numbers as flowers will be receptive for a shorter duration, don't cut down on bees
- Stressed trees will be more sensitive to russet, be careful.
- Little and often irrigation as root systems have been debilitated. Close attention to soil moisture monitoring

Chemical thinning

For stressed trees we believe primary thinning should be conservative e.g. either primaries out of the equation or just use a couple of late ATS or Ethrel/ATS mix directed at 1 year wood bloom (variety dependent)

"Lots of walking and observing at the 6-10 mm stage" will be critical as fruit set is likely to be very block specific. The chemical decisions at this stage will be the most important.

Variability down the row may mean different treatments are required down the same block. **Walk, Walk Walk.**

Secondaries such as BA, BA/ANA, 2 x BA mixes or Metrimetron can all shift fruit if used well. If a tree is very stressed Metamitron may drop photosynthesis to a point that debilitates the tree.

Crop Loading

Will need lots of boots on the ground, observing the trees for the many variables discussed above.

What % of full crop potential are they in 2023/24?
Some of the worst blocks may be better to not crop this year hence 0%
Judge your crop load potential from 0-100%
Can you overcome the shortage of roots/reserves with greater inputs such as nutrition and regular water

Choose the appropriate crop load,
Allowing for an increase the inputs where cashflow allows, then farm to it

The sooner you get down to crop load target the better.

Make sure your chemical thinning is good
Hand thin the weaker blocks first
Get ready to re-thin late dec and into Jan

What extra inputs could be useful to farm to the best crop potential?

- Ensure base fert is great
- Spring N on the ground maybe 25 kg/ha N on mature canopies
- Low biuret foliar N
- Fertigate with CaNo3 plus whatever other macro elements are short, take care not to overdo N as fruit colour will be impacted
- Leaf test in November and adjust nutrient inputs

Disease Management – European Canker and Phytophthora

Presented by: Dr Jim Walker, Plant and Food

Dr Monika Walter

Dr Ian Horner

Dr Mary Horner

Spring Management for Phytophthora

Phytophthora is a fungus-like organism that is mostly soil-borne. It thrives in wet soils and has spores that swim through the soil, attacking roots and causing root rots. It is generally associated with poorly drained areas, waterlogging, or extreme weather events. Cyclone Gabrielle caused significant and prolonged saturation of soil. Lesions caused by Phytophthora are likely to continue to spread within the root system beyond the period of soil saturation, causing ongoing root problems and tree decline. Management interventions can potentially help to reduce ongoing problems.

Signs and symptoms of Phytophthora

Canopy symptoms

The first sign of Phytophthora or other root problems in the spring will be delayed bud burst and flowering. This could be followed by blossom collapse – don't confuse this with fire blight, which will generally be seen as strikes on individual spurs or flowers. Blossom collapse from root disease will likely be more general across the whole tree or large portions of the tree, reflecting insufficient healthy roots to support new blooms and shoots.

Later in the season, affected trees are likely to show poor shoot extension and growth, with leaves smaller than normal. Leaves may turn a purplish colour (Fig. 1), with premature leaf drop in the autumn, or tree death.

Figure 1: Canopy and fruit symptoms of Phytophthora

Trunk symptoms

Phytophthora mainly attacks roots and crowns. Lesions are often seen around the base of the trunk (Fig. 2), advancing up from below ground. Such infections are sometimes difficult to distinguish from fire blight lesions, especially on M9 rootstocks. With advanced infection, Phytophthora lesions may spread up the trunk, sometimes above the graft union (Fig. 3)

Figure 2: Phytophthora crown rot

Figure 3: Phytophthora collar rot

Root symptoms

Phytophthora attacks feeder roots. It then spreads to main roots where it can cause major lesions that eventually cut off whole portions of the root system, and spread to the crown and lower trunk (Fig. 4). If trees have been pulled, examine them for tell-tale signs of Phytophthora infection to help with decisions on ongoing management.

Figure 4: Shedding of the outer layer of roots caused by Phytophthora infection.

Ways to enhance tree recovery

Trees that have been waterlogged for prolonged periods are likely to have had much of their root system damaged, with additional problems caused by Phytophthora infection. There are a number of things that can be done to help such trees and improve their chances of survival and return to full productivity. When considering remedial activities, consider the length of time roots were waterlogged, and excavate a few root systems to inspect root health.

Improve drainage	Dig/clear main drains across headlands. Run drains down rows to remove excess water. This will improve soil aeration and reduce water saturation in future rain events, thus reducing further Phytophthora attack.
Reduce crop load	Reduce Crop load on stressed trees, thin the crop more than normal to give them a chance to recover.
Prune to reduce canopy stress and get trees back into balance.	The canopy reflects what is below ground – if the root system has been damaged by waterlogging and/or Phytophthora, the canopy needs to be similarly reduced to reduce stress and get the tree back into balance.
Gypsum.	Where soil structure and drainage are poor, particularly where there is a high clay content, surface applications of gypsum will help flocculate the soil, helping create a structure with pores and channels that improve drainage.
Phosphorous acid application (also called phosphite or phos acid)	Where trees are badly affected by Phytophthora, phos acid applications will help heal lesions on main roots and crowns, and help protect new feeder roots from further Phytophthora attack. Most growers will have applied phos acid to apple blocks late last season, post-Gabrielle, and this will have helped trees recover from Phytophthora infection. Further applications in the spring/early summer could further enhance tree recovery. Trunk injections or trunk painting can also be considered if the grower wanted to treat their block on a tree-by-tree basis. Note that although phos acid is a safe chemical when handled and applied appropriately, residues can persist for many months and should be considered in any application regime.

Making spring phos acid applications

WARNING! In season phos acid applications are being recommended for flood affected orchards only and should be targeted at those blocks that are showing signs of declining tree health. Applying phos acid during spring means prioritising tree health over market access.

Ensure that market access implications are considered before applying phos acid in spring.
A spring application WILL leave a residue – Taiwan and Hong Kong have a nil detectable MRL.
Phos acid use should be discussed with your technical advisor or spray rep, in particular in regard to fruit finish, different phos acid product rates and types and other application considerations.

Fruit eligibility and market considerations

Fruit eligibility, market considerations and spray diary clearance:

- Any in-season applications of phos acid will result in detectable residues at harvest.
- Phos acid residues are persistent, low levels could potentially be present in the 2024/25 season.
- Taiwan and Hong Kong have no MRL set and therefore a nil detectable residue requirement – this means that any residue detected in market will result in the rejection of this fruit.
- Data on phos acid residues is limited, however the data we have available indicates that the PHI for all markets, except Taiwan and Hong Kong, is mid-December with a maximum number of 2 applications between October and mid-December.
- For a full list of market MRL's refer to the NZAPI PHI/MRL database. Note that other than the markets with NDR, the lowest MRL set is China with 30 mg/kg.
- NZAPI will undertake a series of residue tests on treated blocks this season to build our dataset of residues based on application date.
- NZAPI can facilitate targeted phos acid residue testing with the lab if required.

Timing

- Apply phos acid from 20 mm fruit onwards to ensure sufficient leaf cover and minimise russet risk for export fruit. Phos acid is most effective on leaves that are in good condition.
- Phos acid applications should be made before mid-December. Application after this time could cause residue issues.
- 1 or 2 applications a minimum of 3 weeks apart
- For non-bearing trees or in tree recovery situations where fruit won't be harvested, timing is less crucial as russet and residues are not an issue. Up to 3 in-season applications could be considered.

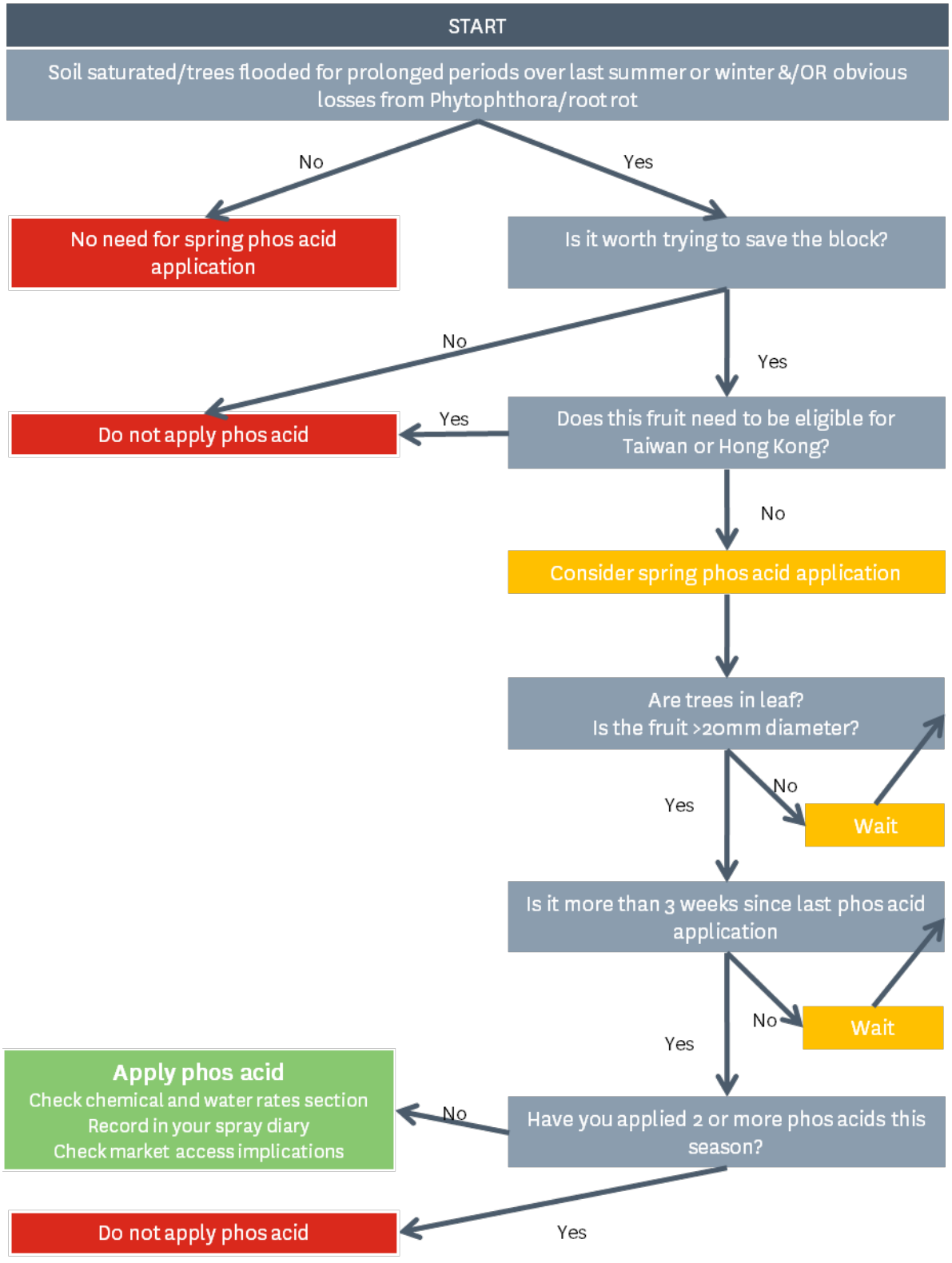
Chemical rates and water rates

- 7.5-10 L/Ha* phos acid in 1000-2000 L/ha water
- Adjust volumes per hectare to account for tree size. Aim for spraying to point of drip.
- Phos acid tank concentrations greater than 0.5% (10 L/800 L) could cause leaf phytotoxicity.
- For spring phos acid applications **do not** tank mix with other products

*Rates stated are for 400g/L formulations

Spring Phos Acid Application Decision Tree

Ensure that market access implications are considered before applying phos acid in spring.
Applying phos acid during spring means prioritising tree health over market access.



Best Management for European Canker

Canker Walks  **Minimum 4 walks/year**	1. Spring/summer 2. Pre-harvest (Jan – Feb) 3. Pre-leaf fall (Immediately postharvest – pre-leaf fall 4. Pre-winter pruning • Consider putting a bounty on canker for staff to identify and tag • Promote a canker specialist/champion. Provide extra staff training to improve disease identification, particularly early symptoms. Supervision of staff necessary. Check for level of detection. • Susceptible varieties need more frequent inoculum removal!
Remove  **Immediately remove cankers from the orchard**	• Branch and trunk canker: cut back at least 30 cm from lesion or until wood tissue is clean. Paint with commercial pruning paint. • If trunk lesions return on same tree then tree is removed. If 2 or more lesions found on trunk, tree is removed. • Grinding of trunk cankers removes the inoculum, but be prepared for the lesion to come back and new trunk cankers to pop up. • Equipment must be cleaned and disinfected at the end of each row. • **Consistent implementation across all blocks all of the time.**
Disposal 	• All infected wood must be removed from orchard daily and burnt or covered until burnt (e.g. tarpaulin). • All lesions left uncovered will produce spores when wetted. All cankers left in the orchard will continue to produce spores. • Chipping and composting is effective in disposing of diseased wood (covered and away from orchard blocks). • **Consistent implementation across all blocks all of the time.**
Post-harvest spray 	• Picking wound cover - Captan in-between picks and after harvest is not effective. • Leaf scar cover - 2-3 captan or copper during leaf fall: 20%, 50% 80% leaf fall. • Avoid foliar nitrogen/urea for *Venturia inaequalis* (black spot) control at early leaf fall. Instead, spray leaves on the ground with urea. • Organic: use slaked lime. Ensure that it is fresh.
Monitoring 	• Set up monitor rows in each block to establish base-line infection status. *(transect canker hot spots, re-visit the same rows)* • Rank each block tree incidence (% trees infected) to prioritise resources. • Monitor progress and share with staff. A data collection APP has been developed.

EARLY EUROPEAN CANKER SYMPTOMS






Canker Walks

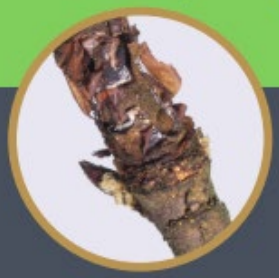
Never do canker walks in the rain, drizzle or fog. Four or more canker walks per year are recommended.

Rank /Timing	Identification	Comment
1. **Pre-picking / during picking**		Picking wounds are highly susceptible to infection, are relatively large wounds and coincide with April inoculum peaks. Spurs are also economically important for next year's crop potential. Captan was found **ineffective** for picking wound protection (but excellent on leaf scars). We do not get adequate coverage and deposition on picking wounds! Picking wound cankers produce more spores than other cankers and must be removed as soon as they are spotted.
2. **After harvest / pre-leaf fall**		Leaf scars are available in the 1000's per tree. While moderately susceptible to infection, the high number of sites and the long leaf fall period with multiple rain and infection events makes this a vulnerable period. Repeat applications (2-3 or more) protective chemical is recommended. Consider artificial defoliation (EDTA Copper) to reduce the time period when protection is needed.
3. **Mid-winter**		A 'tidy-up' exercise. Many lesions are visible during the winter months. The number of cankers found in winter will give you some indication on tree incidence in your block. The winter prune will indicate where hot spots are. The cankers found pre-leaf fall and/or in winter likely were your inoculum sources for harvest (picking wound) and/or autumn (leaf scar) infections. Winter cankers are indicative of the spring infections you will see.

5. **Spring**	 	Post-harvest picking wound infections start to express in as early as July (Waikato) - August (Tasman) and can take as long as January to fully express (Hawke's Bay). Leaf scar infections start to express in October, peaking in Nov/Dec. These timings are changing with the changing climate: the duration from infection to symptoms is shortened by warmer and wetter weather.

CANKER & FIRE BLIGHT

Field ID and pruning



New Zealand Apples & Pears

European canker

Look for

Small dark brown sunken area

European canker

Look for

Flakey bark on canker

European canker

Look for

Old cankers are black and sunken, with cracked rings

European canker

Spring

Look for

Wilted leaves with a canker on the stem/spur

European canker

Pruning

Tip - Consider removing the whole branch if canker is in the limb

European canker

Pruning tips

You must apply commercial pruning paint to all pruning cuts to kill spores

Always remove infected wood from orchard and burn. Cover until burnt

Routine tool hygiene required if pruning out European canker. If pruning out Fire blight at the same time, **you must** follow Fire blight sterilisation rules

Don't prune in the rain

Other cankers

Aerial phytophthora canker

Phomopsis canker

Botryosphaeria canker

Fire blight

Fresh flower infection

Look for
Brown or black flowers. Handpick or cut out the whole floral cluster

Fire blight

Fresh shoot infection

Look for
Bent wilted shoot tips and black stems

Fire blight

Dried shoot

Look for
Dead and bent over shoot tips

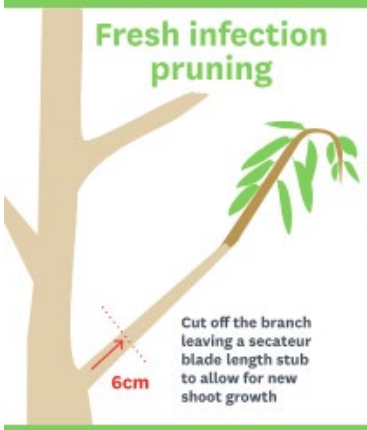
Fire blight

Cankers

Look for
Black/burnt/sunken

Fire blight

Fresh infection pruning



Fire blight

Dried infection & canker pruning

Fire blight

Sterilising solutions

When pruning for Fire blight you must use an effective sterilant solution. Clean tools between every cut

DETTOL SOLUTION
90% Water
10% Dettol

METHYLATED SPIRIT SOLUTION
20% Water
80% Methylated spirits

BLEACH – SODIUM HYPOCHLORITE SOLUTION
75% Water
25% Household bleach (4% NaOCL)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