

Gold3 Winter Field Day
23rd June 2020
Scott Gold Orchard, Pongakawa

2020 Harvest Outcomes

Trevelyan’s packing data shows that average trays/ha were higher for the 2020 season when compared to the 2019 season, while fruit size was similar. The average yield from all conventional Trevelyan’s Gold3 orchards in 2020 was 15,506 trays/ha (v’s 14,099 in 2019 and 14,177 in 2018).

A breakdown of yield averages by region by fruit group are (2019 data in brackets):

Area	GACK	GAOB
	Trays/ha	Trays/ha
Athenree/Waihi Beach		10,537 (10,608)
Bethlehem/Te Puna	17,264 (16,158)	
Hawkes Bay	11,912 (12,925)	
Kaimais	5,672 (13,140)	
Katikati	15,082 (13,406)	
Maketu	17,261 (19,051)	12,252 (2,805)
Maniatutu	16,657 (13,537)	
Opotiki East	11,224 (3,655)	11,162 (12,904)
Paengaroa	16,627 (14,381)	
Pukehina	17,593 (15,981)	
Rangiuru	15,562 (14,276)	15,384 (11,998)
Te Matai	14,420 (15,221)	14,141 (12,402)
Te Puke No1 & No 2	15,905 (15,004)	12,433 (10,093)
Te Puke No3/Manoeka	14,976 (15,995)	
Welcome Bay/Matapihi	18,398 (21,631)	
Whakamaramara/Apata	13,026 (8,958)	
Whakatane	11,980 (11,334)	
Whakatane North West	9,493 (18,658)	
OVERALL	15,506 (14,099)	12,420 (10,882)
Average fruit size	29.6 (29.9)	29.0 (29.0)

Please note that some of this variation is due to graft year and changes in production due to vine maturity etc.

Scott Gold Orchard Production History – altitude 31m

Scott Gold is 7.74ha Gold3 orchard, essentially two large blocks split into five Maturity Areas.

Block 1 (MA's 1-2) is 4.01ha and was grafted in 2012, while Block 2 (MA's 3-5) is 3.73ha and was grafted in 2010.

The 3 year rolling averages for each MA are:

		Maturity Area		
		MA2	MA4	MA5
Yield (Size)	2018	17,640 (24.3)	15,477 (21.9)	6,358 (22.0)
	2019	19,366 (24.9)	26,737 (24.5)	12,154 (25.1)
	2020	18,530 (28.0)	23,032 (27.0)	9,925 (25.7)
	Ave	18,512 (25.7)	21,749 (24.5)	9,479 (24.3)

Winter Pruning – Setting the foundation

1. Review last season

Take the opportunity to review last season's orchard performance including your packout reports and orchard management. Consider all factors such as reject rates, % of Class 1 packed, taste, yield, pest and disease pressures. If you aren't sure how to interpret these measures, discuss with your Trevelyan's Grower Services Representative.

Don't forget that the last two summers have been particularly dry and as such, vines may be experiencing drought stress. Unless your vines have been well irrigated over the past two summers, pushing yields too hard in the coming season may result in sick/dying vines, fruit abortion or fruit that struggles to meet Zespri's Minimum Taste Standards

Don't forget to check both the Trevelyan's Grower Portal and the Zespri Industry Portal which provide an increasing range of metrics allowing you to compare your results against previous years, and across the industry (Figure 1 and 2). Examples of the type of data available on the Zespri Portal are shown over the page – refer to Canopy > Zespri & The Kiwifruit Industry > Tools & Calculators > Zespri Industry Portal for more information.

Once you have determined if there is opportunity for improvement and where this can be achieved, it is time to develop a plan.

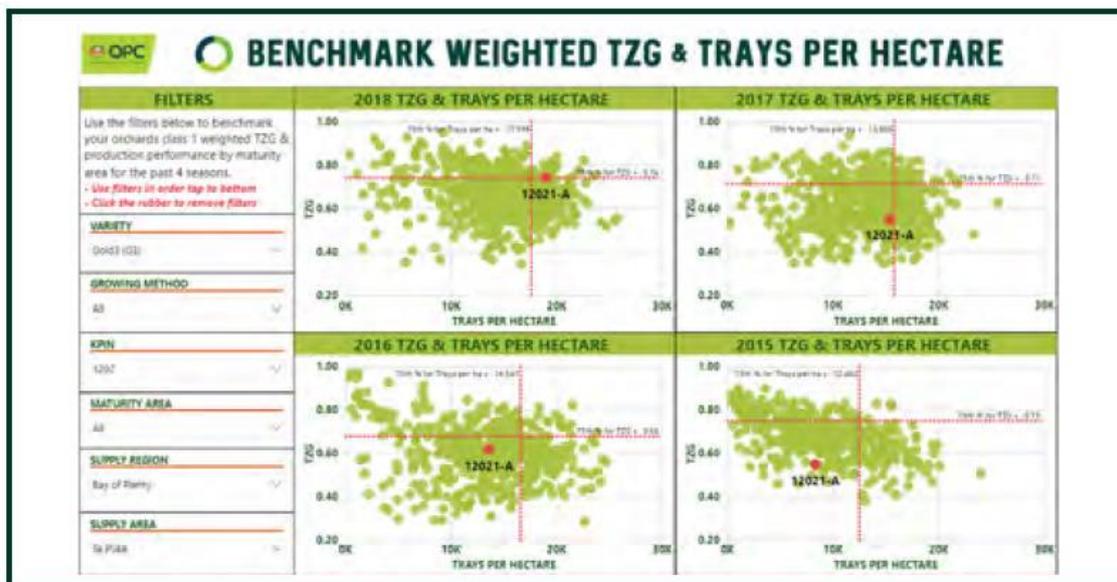


Figure 1. Example of benchmarking reports available on the Zespri Industry Portal – weighted TZG and trays/ha.

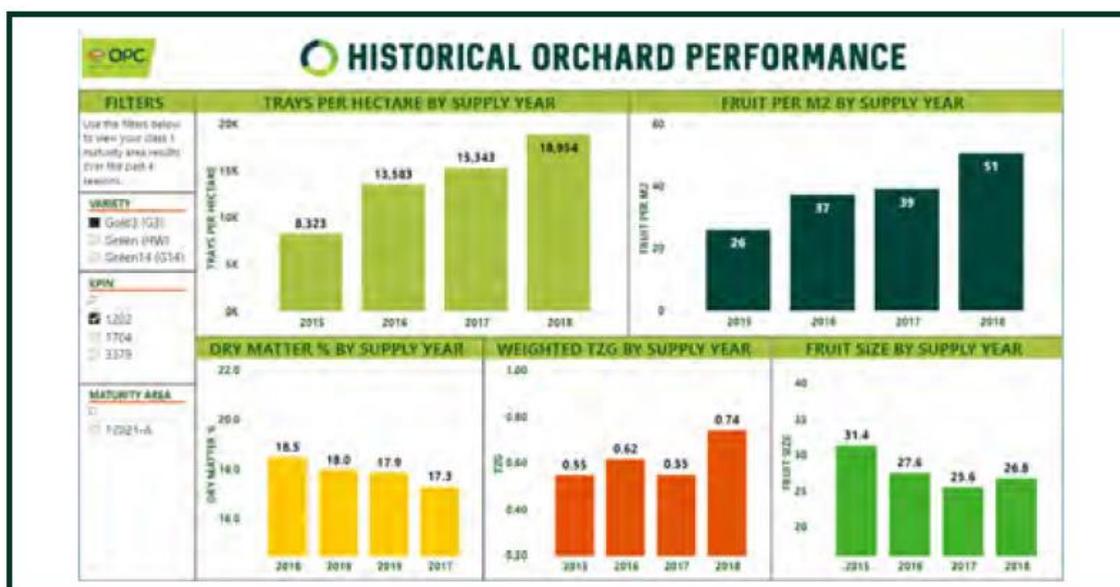


Figure 2. Example of benchmarking reports available on the Zespri Industry Portal – historical orchard performance.

2. Make a plan

Use historical performance to develop a plan for the season ahead. This plan may involve tweaks to various factors including nutrient inputs, budbreaker timing, pest management etc, but importantly identifying how many trays/ha and taste you are aiming for must be addressed now to ensure the correct amount and type of cane is tied down this winter. Gradually improving vine structure will lead to improved wood quality across the whole canopy and improve spray coverage therefore improving pest and disease control.

If your orchard is thriving, you may have the ability to increase yield without sacrificing taste by tying down more quality wood. Or it may be that you struggled with taste last

season and have identified that too many canes were tied down or cane selection was poor. Whatever you decide, it is very important to clearly communicate your winter pruning plan with your team or pruning contractor.

Clearly state the type of wood you require and what your cane spacing requirements are, and have the contractor repeat back this to you. Providing these specifications in written form on a “spec sheet” will ensure you both understand the message.

3. Monitoring your workers

Laying the foundations of the coming season starts with your winter prune. If mistakes are made here, your harvest and returns will be affected. Even though you have communicated your expectations to your team, it is extremely important that you follow up by monitoring their work closely and feed back your findings immediately. Assessing the wood type and counting the number of winter buds/m² (or per bay) is an important measure that all high performing orchardists do. Trevelyan’s have a bud counting service available on request.

If possible – be present in the orchard to oversee the quality of the work undertaken – a few hours of poor pruning can result in years of consequences!

Winter Pruning Basic Points

- **Orchard hygiene**

Studies have shown that the vine is highly susceptible to Psa for 3 days after winter pruning. Apply a copper at winter rates before pruning starts (to lower Psa inoculum levels) and immediately after winter pruning (as a protectant). For large cuts, consider applying a wound protectant such as InocBloc, Prunetec or Greenseal Ultra. Avoid pruning in wet conditions and maintain pruning tool hygiene from vine to vine, especially where infection is present in the block.

- **Saw work**

Depending on the age of your Gold3 vines, the removal of high structures above the top of the leaders may be required. High structures can be a source of high vigour, large diameter canes and late season growth which compete with fruit for dry matter later in the season and creates shading (particularly in the leader zone). Removal of high points allows more light into the canopy, improves spur quality for the following year and increases productivity between the leader and the second wire. Choose the worst structures to remove first from the leader.

- **Cane selection.**

Select moderate vigour strung cane or if unstrung, fruit stalk cane and strong spurs that have been growing in full sunlight without shade (ideally around 5mm in

diameter). Typically, these canes give the best result as they give the maximum flower to winter bud ratio response.

Plant and Food Research has shown that canes that are shaded had 50% less flower numbers than unshaded canes.

Where possible try to retain consistency, avoiding a mix of strong and weak canes. Large diameter canes grow vigorously and will produce other large, vigorous cane.

If medium-large diameter canes are used, then increase spacing to at least 400mm.

Internode spacing is important – if your canes have short internode spacing (as is being observed in some Gold3 orchard this winter), you may need to adjust your cane spacing to compensate – otherwise you may have too many flower buds/m² resulting in an increased thinning bill later in the season.

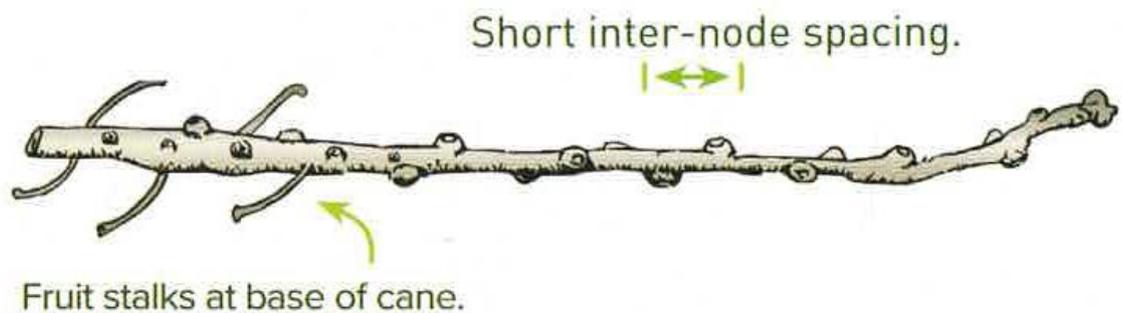


Figure 3. Ideal replacement cane

- **Cane spacing.**

Achieve an even cane spacing with typical spacing between 300mm and 400mm apart and aim to evenly fill the canopy.

- The 300mm spacing will work on strip male systems with low vigour canes.
- A 400mm spacing is ideal for larger diameter canes off strings.

Assess your internode length and conduct bud counts between wires to ensure your winter bud target is being achieved. The leader to first and second wire zone is a critical area in this regard. If you had areas of dense canopy develop last season it is possible that cane spacing was too close there last winter prune.

- **Fill the canopy**

Aim for no gaps and holes, even if this means tying down “less than optimal” cane – you are better to have some fruit than no fruit at all! Use bud counts between wires to ensure that your winter bud target is being achieved. See the bud count section later in this handout

Counting buds – how many do I need?

- Calculate how many winter buds you need to meet your target.

- A target of at least 28 quality buds per square metre is advisable. If your flower to winter bud ratio and conversion from flowers to export fruit are high then you will need fewer buds. Trevelyan's have a bud counting service available on request.
- Trevelyan's has developed a Gold3 Winter Bud Conversion Matrix - available on the Trevelyan's Grower website (Figure 4). The Zespri OPC team has many resources also available on the Zespri Canopy website to assist.
- Use bud counts to ensure you are meeting your bud number targets.
- The spacing of buds varies with wood type.
 - Generally, well grown fruit stalk canes will have optimum close bud spacing. These canes have close bud spacing with high flower to winter bud ratios allowing for high yields without overcrowding canes.
- Focus on the leader zone - are there sufficient buds between the leader and first wire?
- Use bud counting to ensure that even canopy fill is being achieved.



GOLD3 WINTER BUD CONVERSION MATRIX

FLOWERS PER WINTER BUD (based on winter chill)										
WINTER BUDS/m ²	Ave size 27			Ave size 30			Ave size 33			
	1.8	2.0	2.2	1.8	2.0	2.2	1.8	2.0	2.2	
	26	14,040	15,600	17,160	12,636	14,040	15,444	11,487	12,764	14,404
	27	14,580	16,200	17,820	13,122	14,580	16,038	11,929	13,255	14,580
	28	15,120	16,800	18,480	13,608	15,120	16,632	12,371	13,745	15,120
	29	15,660	17,400	19,140	14,094	15,660	17,226	12,813	14,236	15,560
	30	16,200	18,000	19,800	14,580	16,200	17,820	13,255	14,727	16,200
	31	16,740	18,600	20,460	15,066	16,740	18,414	13,696	15,218	16,740
	32	17,280	19,200	21,120	15,552	17,280	19,008	14,138	15,709	17,280
	33	17,820	19,800	21,780	16,038	17,820	19,602	14,580	16,200	17,820
34	18,360	20,400	22,440	16,524	18,360	20,196	15,022	16,691	18,360	
35	18,900	21,000	23,100	17,010	18,900	20,790	15,464	17,182	18,900	

* Please note that the above calculations assume:

- A 90% flower to fruit conversion rate and a 10% reject rate at packing

- Gold3 bud guide:**
- Good winter chill – 2.2 buds/m²
 - Poor winter chill – 1.8 buds/m²

Figure 4. Example of the Trevelyan's Gold3 Winter Bud Conversion Matrix available on the Trevelyan's Grower Website

Winter chill

May–July is critical to provide sufficient winter chilling to enable good budbreak and adequate flower numbers per winter bud. To date, 2020 winter chill hours appear to be tracking below all years for the previous five seasons – and about 20 hours behind 2018 at the same point (Figure 5).

Plant and Food trials have indicated that a 2°C rise in the average May temperature can change the natural budbreak date by as much as 7 days. It is important that you know the amount of winter chill experienced on your orchard as it may impact on the ideal budbreaker application window.

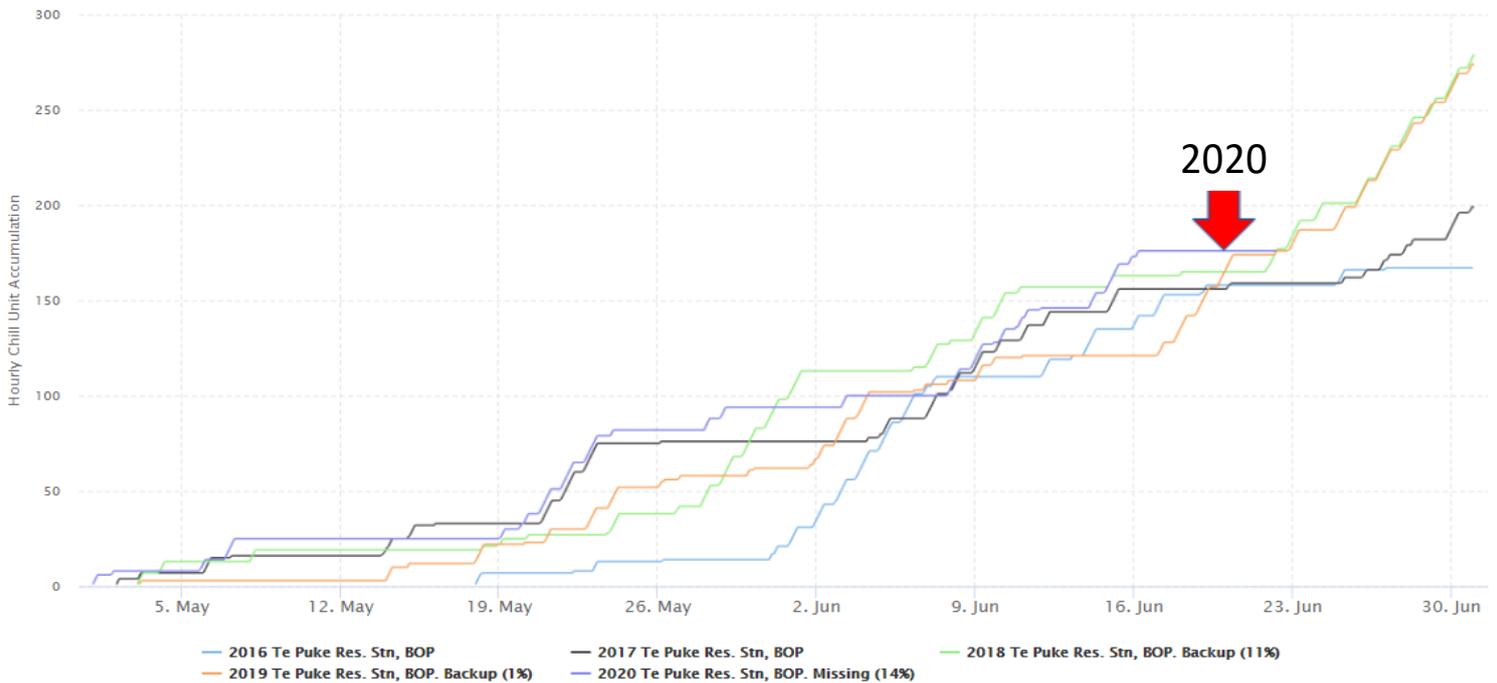


Figure 5. Te Puke Winter Chill Accumulation (KVH website) – 176 units to date

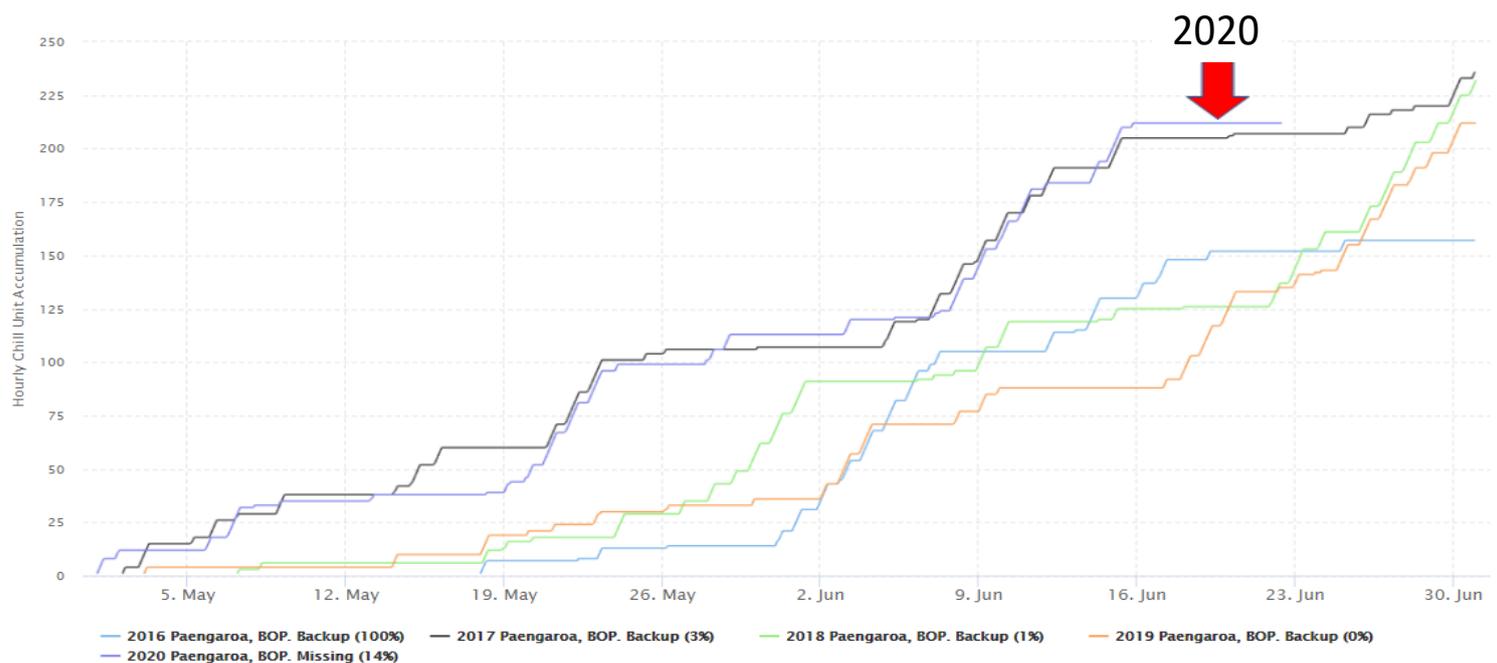


Figure 6. Paengaroa Winter Chill Accumulation (KVH website) – 212 units to date

Estimating budbreak and Hydrogen Cyanamide (HC) application windows

Historical methods of predicting hydrogen cyanamide (HC) application dates rely on the knowledge that the ideal “window” for applying HC is 28-35 days prior to natural budbreak (Hayward is typically 7-10 days behind on the same site). Therefore, to predict when this “HC window” is we must first determine when natural budbreak occurs. There are several “predictors” available, but the simplest, accurate and widely used is the Massey University Model (refer Zespri KiwiTech Bulletin N81 – Predicting Budburst). This model supports the theory that early winter chilling is most critical in determining the date of natural budbreak, whereas the latter months of July-September can further influence the timing and rate of budburst.

Trevelyan’s has developed a Budbreak Predictor for HC applications which is available on the Trevelyan’s Grower Website (Figure 7). To use this calculator, you simply need to know the average temperatures from your site (or a site nearest to you) for the months of May and June. By simply entering these dates, the predictor gives you an “application window” for both Gold3 and Hayward using the Massey Model calculation. Further resources can be found on the Canopy website (Canopy>Growing Kiwifruit>Orchard Management>Budbreak>Identify, predict & monitor budbreak).



Budbreak Predictor for Hydrogen Cyanamide applications – 2020

(based on Massey University Budbreak Predictor model - refer Zespri OPC for more information)

Metric	Te Puke (Plant and Food)	Paengaroa
Ave May Temp (°C)	12.17	11.98
Ave June Temp (°C)	11.22	11.14

Hayward Estimated Dates		
HW estimated start of budbreak	20 September 2020	21 September 2020
HW estimated Hydrogen Cyanamide application dates - apply between:	11 August 2020	10 August 2020
	18 August 2020	17 August 2020

Gold3 Estimated Dates		
G3 estimated start of budbreak	6 September 2020	7 September 2020
G3 estimated Hydrogen Cyanamide application dates - apply between:	30 July 2020	29 July 2020
	14 August 2020	13 July 2020

Figure 7. Example of the Trevelyan’s Budbreak Predictor for HC applications available on the Trevelyan’s Grower Website

The use of hydrogen cyanamide as a budbreaker

Hydrogen cyanamide (HC) is a very effective, cheap and forgiving option for conventional growers to lift productivity in the orchard. While the exact mode of action is not well understood, we do know that if applied at the correct time it promotes uniform budbreak, condenses flowering, increases flower numbers, reduces lateral flowers and improves the synchronicity of male and female flowers. HC must be used carefully and responsibly however ensuring applicators, the local community and

the environment are well protected. Without this heightened level of care, HC is a tool that Zespri could remove from the Crop Protection Standard without warning.

Remember the basics of HC application:

1. Notify your neighbours of your planned HC application – give them plenty of time to allow them to move pets, stock, playground equipment or bring in their washing.
2. Use the spray appropriate signage on roadsides/at the orchard entrance
3. Be extra cautious around sensitive areas such as parks, playgrounds, schools, roads, waterways etc
4. Check your sprayer pattern with water only before you spray HC
 - a. HC efficacy requires the spray to visibly project droplets about one metre above the target canopy – you may need to reduce the sprayer pressure if your spray pattern is higher than this
 - b. Use water sensitive papers if possible to measure/ensure spray coverage
5. Use the correct HC product rate – industry typically use 6L/100L of product in 500-700L water per hectare
6. You must use a drift reducing adjuvant (i.e. Driftstop/Surecane) - typically @ 100 - 200ml/100L (higher rates around sensitive areas or where you want to reduce drift further)
7. You must use Air Inclusion (AI) nozzles
8. Do not spray when the wind is blowing above 20km/hr (or a light “rustling” in tree leaves)
9. Adjust your spraying for the conditions - unpruned canopies and wide row spacings may require a greater volume of air and/or slower travel speeds
10. Avoid spraying wet canes or spraying under very cold slow drying conditions
11. Maintain a 7-day interval between applications of copper and HC
12. The orchard re-entry period for HC is 5 days – keep people out of the orchard during this period.

There is a huge amount of information available on the Zespri Canopy regarding HC applications – refer to Canopy>Growing Kiwifruit>Orchard Management>Hydrogen Cyanamide and/or the Spray Tech Box (link from the Hydrogen Cyanamide page on the Canopy).

Of particular interest are the following Kiwifruit Journal Articles:

- KFJ July/Aug 2016: Penetrating dormant buds and canes (Robyn Gaskin - PPCNZ)
 - Study showed that HC was rapidly absorbed by the dormant canes under a wide range of weather conditions. The addition of DriftStop was fundamental – promoting faster HC penetration into buds and canes, improving rain fastness and reduces the risk of HC burn.
 - Wet canes reduce efficacy of HC due to the risk of run-off.
 - This article can be found on the Zespri Canopy – (<https://canopy.zespri.com/EN/industry/pubs/journal/Documents/Penetrating-dormant-buds-canes.pdf>)

- KFJ May/June 2017: Hydrogen Cyanamide use on Gold3 (David Tanner – StartAfresh Limited and Gustavo Hernandez – PunchBowl PackCo)

- A HC rate of 6% produced the highest level of budbreak, king flowers/winter bud and king flowers/shoot (higher rates of HC resulted in lower levels of king flowers/winter bud and a greater level of blind shoots).
- Earlier HC applications had a poorer budbreak result but was compensated for by a greater number of king flowers on the buds that did break.
- This article can be found on the Zespri Canopy – (<https://canopy.zespri.com/EN/industry/pubs/journal/Documents/HC-on-G3.pdf>)



Figure 8. HC applied at 6% with no DriftStop (30 sec after application) - KFJ July/Aug 2016: Penetrating dormant buds and canes (Robyn Gaskin - PPCNZ).



Figure 9. HC applied at 6% plus DriftStop at 200ml/100L (30 sec after application) - KFJ July/Aug 2016: Penetrating dormant buds and canes (Robyn Gaskin - PPCNZ).

Crop Protection

Psa Management

- Cultural tools
 - Avoid pruning in wet conditions and maintain pruning tool hygiene from vine to vine, especially where infection is present in the block.
 - Continue to monitor for Psa regularly and remove secondary infection promptly.
- Copper
 - Apply at recommended winter rates
 - Kocide/Champion @ 70-90g/100L
 - Nordox 55-70g/100L)
- Wound protectants
 - Spray copper before (to reduce inoculum loads) before and after pruning (to protect the recent cuts).
 - On major cuts/saw work use a pruning paint such as InocBloc where practical.
 - Alternatively apply a high concentration liquid solution via a hand-held spray bottle targeting spraying onto wounds (not via orchard sprayer)
 - Spray - Nordox at 7g/L (7% solution)
 - Caution - these are high copper concentrations and growers must avoid eye contact

- Make sure that all winter prunings are mulched as this can remain a source of *Psa inoculum* for more than 5 weeks in the orchard.

Pest Control

- Scale
 - Trevelyan's scale finds for 2020 are similar to the 2019 season, however Zespri reports that China may be moving to including *Latania* scale as a quarantine pest – this will be significant!
 - Spring applications for scale control give good control in most instances
 - Growers with significant scale issues should consider additional dormancy scale control options
 - Zespri allows 2 x pre-flower scale sprays without a Justified Approval (JA)
 - Growers can apply to Zespri for additional scale sprays with justification if scale numbers were high the previous season
 - An application of bifenthrin (Assail® or Venom®) at 40g/100L targeting the leader zone is also useful for scale control (can be used if leaf condition has deteriorated), or;
 - Oil (targeting the vine structures) applied during winter is also an effective option – this will require a JA.
 - Organic growers
 - Plant and Food trials suggest that an application of 1% Excel Oil plus 37.5g/100L Nordox applied in the last week of August AND mid-late October is effective at managing scale
 - Oil (targeting the vine structures) applied during winter is also an effective option (if concerned about copper use).
- Cicada eggs
 - A Plant and Food report (Feb 2016) on the “Effect of winter pruning and mulching on cicada egg hatch” determined that double mulching of winter prunings destroyed/partly shattered 80-97% of cicada egg nests.
 - Note - Pruned egg nests on the ground that are not mulched can produce Cicada nymphs for at least a month.
 - Chemical option - apply rates of 1L/ha of Assail® with 1L/ha on Engulf® at 1000L/ha to penetrate the wood and kill the eggs (applied with conventional spray nozzles for best results)
 - Venom and Wetcit is also an alternative
 - Results can be variable - the use of a penetrant is the key.
 - If spray drift is an issue then AI nozzles can be used (without Driftstop™) but the rate of Engulf should be increased to 1.2L/ha – refer product label.
 - Application should occur as soon after leaf fall as possible to maximise the level of kill (after harvest but before winter pruning).
 - Do not apply within 3 days of copper (before or after application)

- Due to the high rates of Assail/Venom used – this application counts towards one of the 2 x pre-flower scale sprays allowed per season by Zespri.
- Passion Vine Hopper
 - Applications of bifenthrin + penetrant for Cicada will have some impact on PVH eggs, although PVH eggs are typically laid in different wood within the orchard (i.e. old (2nd year) fruit stalks and edges of timber support structures)
 - To target PVH eggs only apply at 1L/ha Assail® with 1.2L/ha Engulf® during dormancy, targeting “soft wood” (old fruit stalks and wooden structures)
 - refer to Zespri Crop Protection Standard or product label.
 - A dormancy spray for PVH also counts towards one of the 2 x pre-flower scale sprays allowed per season by Zespri

Weed control - Pampas

- Often mistaken for Toetoe (toitoe) but is an exotic plant (non-native)
 - If you see flowerheads around harvest – it’s pampas!
- If present in orchard surrounds, plants can be controlled by;
 - Cultural control - dig out and burn/bury the flowerheads
 - Chemical control – apply glyphosate (i.e. RoundUp) at 1L/100L plus a penetrant – refer to your local merchant



Figure 9. **Pampas** - photo courtesy of KVH



Figure 10. **Toetoe** - photo courtesy of KVH



GOLD3 WINTER BUD CONVERSION MATRIX

FLOWERS PER WINTER BUD (based on winter chill)										
WINTER BUDS/m ²	Ave size 27			Ave size 30			Ave size 33			
	1.8	2.0	2.2	1.8	2.0	2.2	1.8	2.0	2.2	
	26	14,040	15,600	17,160	12,636	14,040	15,444	11,487	12,764	14,404
	27	14,580	16,200	17,820	13,122	14,580	16,038	11,929	13,255	14,580
	28	15,120	16,800	18,480	13,608	15,120	16,632	12,371	13,745	15,120
	29	15,660	17,400	19,140	14,094	15,660	17,226	12,813	14,236	15,560
	30	16,200	18,000	19,800	14,580	16,200	17,820	13,255	14,727	16,200
	31	16,740	18,600	20,460	15,066	16,740	18,414	13,696	15,218	16,740
	32	17,280	19,200	21,120	15,552	17,280	19,008	14,138	15,709	17,280
	33	17,820	19,800	21,780	16,038	17,820	19,602	14,580	16,200	17,820
34	18,360	20,400	22,440	16,524	18,360	20,196	15,022	16,691	18,360	
35	18,900	21,000	23,100	17,010	18,900	20,790	15,464	17,182	18,900	

* Please note that the above calculations assume:

- A 90% flower to fruit conversion rate and a 10% reject rate at packing

Gold3 bud guide:

- Good winter chill – 2.2 buds/m²
- Poor winter chill – 1.8 buds/m²



HAYWARD WINTER BUD CONVERSION MATRIX

FLOWERS PER WINTER BUD (based on winter chill)										
WINTER BUDS/m ²	Ave size 30			Ave size 33			Ave size 36			
	1.4	1.6	1.8	1.4	1.6	1.8	1.4	1.6	1.8	
	26	9,828	11,232	12,636	8,935	10,211	11,487	8,190	9,360	10,530
	27	10,206	11,664	13,122	9,278	10,604	11,929	8,505	9,720	10,935
	28	10,584	12,096	13,608	9,622	10,966	12,371	8,820	10,080	11,340
	29	10,962	12,528	14,094	9,965	11,389	12,813	9,135	10,440	11,745
	30	11,340	12,960	14,580	10,309	11,782	13,255	9,450	10,800	12,150
	31	11,718	13,392	15,066	10,653	12,175	13,696	9,765	11,160	12,555
	32	12,096	13,824	15,552	10,996	12,567	14,138	10,080	11,520	12,960
	33	12,474	14,246	16,038	11,340	12,960	14,580	10,395	11,880	13,365
34	12,852	14,688	16,524	11,684	13,353	15,022	10,710	12,240	13,770	
35	13,230	15,120	17,010	12,027	13,745	15,464	11,025	12,600	14,175	

* Please note that the above calculations assume:

- A 90% flower to fruit conversion rate and a 10% reject rate at packing

HW bud guide:

- Good winter chill – 1.8 buds/m²
- Poor winter chill – 1.4 buds/m²