WE'RE ALL ABOUT AVO'S!

NEWSLETTER AUTUMN 2020

www.justavocados.co.nz | 54 Woodland Road, Katikati | 07 549 3027

Welcome to our Autumn Newsletter,

I hope you have managed to stay safe through the recent challenging times of alert level 4 lockdown. Darling Group and Just Avocados are fortunate to be operating in an essential industry and apart from most staff working from home during this time and into level three – we were all able to carry on as normal with harvesting and packing – with of course the necessary protocols in place for hygiene and physical distancing.

When our Woodland Road packhouse was audited by MPI in mid-April, on our protocols in place for operating during this time, Just Avocados was commended on the high level of procedure we had put in place and operated to in such a short time. Thank you to the team for putting in place and adapting to the protocols quickly to ensure we could continue operating for those growers with fruit still to process for the local market.

Looking ahead, crop estimate 1 was released by New Zealand Avocado on 22 April showing a total crop of 7.2m trays. This is slightly up from 2019-20 actuals of 7.0m trays. Estimate 1 for the 2019-20 season was 6.3m trays.

Exciting news for the business is the appointment of Andrew Cutfield to GM Investor Relations and Supply. With a focus on avocado supply, Andrew's responsibilities at Darling Group are identifying and creating new equity partnerships, managing existing partnerships and working with the Just Avocados Grower Services team to manage supply from privately owned orchards. Andrew has been a Just Avocados grower for seven years and was also a Trustee on the Just Avocados Trust for five years. His background of ten years in rural banking with ASB and prior to that in forestry managing large scale operations and developments has set him up well to add value to our grower base and investment partners.

Just Avocados' supply agreements for the new season will be out shortly. If you have any questions about the season ahead please contact John, Kyra, Andrew C. or Jacob.

Inside the following pages, Erica goes in-depth on Phytophthora and how to protect your orchard. We feature an impressive new method of growing under full shade netting. John and Kyra give a roundup of what's happening in Northland and the Bay of Plenty and Ashley shares a little more detail on the change from NZGAP to GLOBALG.A.P.

Happy reading.

Regards,

Andrew Darling

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IN THE MARKETS

JUST AVOCADOS MARKET UPDATE

Export for the 2019-20 season came to an end in February with pleasing progress made across all markets despite some challenges along the way.

Positive progress has been made towards our strategy to put 50% of export volume into Asia; the total volume shipped to Asia this year increased from 28% (2018-19) to 40% (2019-20).

ASIA

Thailand and Taiwan have emerged as the success stories in Asia with our total export volume to these markets increasing by well over 100% versus the 2018-19 season.

Singapore and Hong Kong volumes also increased significantly this season and proved to be suitable markets for fruit sized 30ct and smaller.

We introduced a 35ct single layer tray to compete with Mexican origin fruit in the Asian markets, which along with our new prepacks created value for a fruit size that would have otherwise ended up in a saturated Australian wholesale market.

We sent our first air freight shipment to India in January which out turned well and has set us up to establish season-long programmes in a rapidly developing market in seasons to come.

AUSTRALIA

Australian retail finished mid-January with total volume exceeding preseason programme commitments and overall feedback in market being positive throughout the season on New Zealand fruit.

QUALITY

Overall quality has been good this season with some minor niggles particularly in the first half of the season when there was much more rainfall. Challenges around this time, meant progress in the Korean market was not as rapid as the industry intended however, we still increased our volume shipped in to this market versus last year.

POOL FINALISATION

First pool payments have now been finalised and paid whilst the second pool is a work in progress and we aim to have an update to you on finalisation and payment timing shortly.

LOCAL MARKET

We continue to pick and pack for the domestic market but urge you to keep in close contact with us during lockdown due to many uncertainties for volumes and returns with the current situation. New Zealand Avocado has implemented a marketing push recently to encourage kiwis to continue eating avocado during this time.

LOOKING AHEAD TO 2020-21

Just Avocados' marketing strategy will continue this season with a strong focus on profitability and market development in Asia - this region is the future for growth for Just Avocados. Targeting key 'premium' markets in Asia and providing a model with multiple marketing options for growers means you can align yourself with an exporter that enables a profitable outcome.

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Promotion of Darling Avocado in Thailand supermarket.

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At a glance, our marketing activity for the coming season includes:

- Developing a market plan to accommodate growers needs around harvest timing, tree health and on-going fruit production. We believe this will involve 50% of our volumes going to Australia and 50% into Asia.
- Increasing our market share to about 35% into key 'premium' Asian markets.
- Further brand building for Darling Avocado and Jake's avocado in their respective markets in the form of tasting events, branded displays, point of sale information, retailer education, and connecting with consumers through experiential and digital activity.
- Continuing our work on brand development and marketing to quantify a premium for New Zealand avocados.
- Increasing our Australian retail percentage to 80% of our total volume shipped to Australia. Up from 70% in the 2019-20 season.
- Further progression of our third-party logistics model in Australia, with our new facility being completed for the commencement of the 2020-21 season allowing us to deliver fruit to the market quicker than the status quo.
- Continuing to providing three marketing options for growers to align with individuals' orchard goals - consignment, early pool, late pool.

Further detail on our marketing plans and activity will be shared with you through our regular e-bulletins. You are also welcome to contact the team or me at any time if you would like to discuss this aspect in more detail.

ON THE ORCHARD

JOHN'S JOTTINGS – ORCHARD NEWS FROM NORTHLAND AND SOUTH AUCKLAND

FAR NORTH

The dry summer has extended into autumn with only token amounts of rainfall in the district. All the orchards are fully irrigated, and I have been making use of fertigation during this period.

There is constant discussion in the community around water usage and consents, which are being handled through the appropriate channels.

There are also many positive stories emerging of the difference the increased employment opportunities are making to people. The number of families that now have one or two members in full time work because of the avocado industry is making a huge difference in their lives.

The new developments in this area are continuing with growers and Iwi still establishing orchards on a range of scales.

Crops set in general is similar to last year with some orchards setting heavier crops than the previous season. Fruit is sizing well, despite the dry, and pest pressure is low to medium, with thrips just starting to show up.

I have seen some stand out return crops on 6 to 8-year-old clonals from a husband and wife team in the Ngataki area.

Orchard sales are also still positive in the Far North with medium sized properties selling for good values and reasonably quickly.

Good sized fruit.

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MID NORTH

Again, desperately in need of rainfall in this area. Maungatapere orchards have set heavy crops, some the heaviest on record. Not all the orchards have irrigation systems, and not all of those that do are as good as they could be. Despite this, fruit has sized considerably in the last few weeks.

Some growers have taken to pruning off the stalks on the top of trees that have fruit but no leaf cover in an

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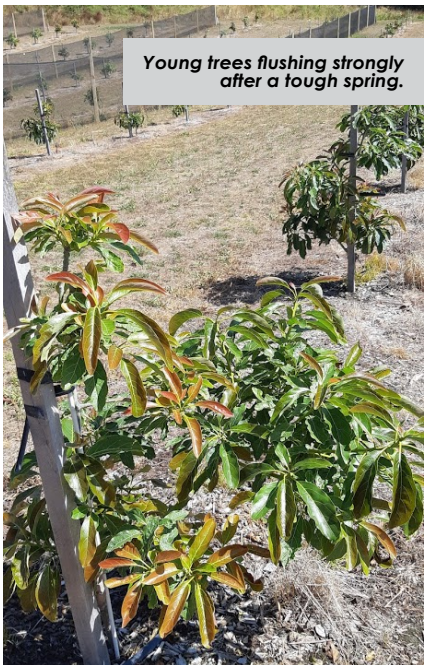
effort to reduce crop load, stimulate growth, and reduce small and sunburnt fruit.

There is a small volume of domestic fruit still to be harvested for us in this region.

IN THE FIELD
There is little evidence of the staining problem again this year, but we have had two dry summers. It will be interesting to see if it starts appearing again when regular rain events start.

The odd orchard is reporting high six-spotted-mite levels which is unusual at this time of the year. There is no obvious reason for this.

There are also some reasonably sized new developments around Maungatapere on the side of Whatatiriri mountain. The largest is around the 40-hectare mark, and the smallest being 1 hectare. Planting distances are varied from 12 mtr x 12 mtr down to 6 mtr x 3 mtr.


Young trees flushing strongly after a tough spring.

The young trees that survived the recent spate of disease infection are flushing away strongly and hopefully will emerge from the next spring in better condition than last year. New Zealand Avocado is doing some good work on identifying the pathogens concerned and we are able to assist growers with the best course of action to take if you have newly planted trees. ●

ORCHARD NEWS FROM THE BAY OF PLENTY

In a very short space of time, our New Zealand way of life has changed with kiwis in lock down to break the chain of transmission of COVID-19. At this time, we must look after ourselves and our families first and appreciate the work the Government and all essential workers are doing to get us back into some form of normality as quickly as possible.

Even though local market sales have slowed in ISO week 14, I am feeling optimistic that those kiwis that enjoyed their smashed avocado on toast or guacamole dip with their corn chips will get sick of tinned spaghetti and rice dishes and purchase our amazing essential avocados themselves to cook up a storm in their kitchen, I guess we'll have to wait and see!

SUSTAINABILITY
Pre lock down, it was great to get together with growers and New Zealand Avocado for their workshops on sustainability. We discussed what the social, economic and environmental aspects of orcharding mean to you individually and how we can plan and be prepared for future developments in this space. The industry is leading discussion on this topic and we look forward to being a part of the continuing conversation.

LONG HOT SUMMER
It has been one very long hot summer, great for enjoying "the great kiwi summer" we all live for but the trees are being compromised and we need as much tree health as we can muster heading into the cooler winter months.

It is important to maximise root development and soil microbe activity, particularly the connection between the avocado roots and mycorrhiza fungi, in the timeframe between our first autumn rainfall and when temperatures drop into winter to push fruit size and tree health. Build organic matter up and add diverse soil microbial food sources when moisture returns to soil, mulching prunings, woody plant material including hedge clippings, adding compost, fish, seaweed or organic fertiliser to stimulate and support microbes breaking down mulch. You can even add into your soil, beneficial fungi inoculants to kick start the process like Trichoderma, adding humic acids supports the efficacy of fungi inoculants in soil applications.

CROP ESTIMATE
We recently sent out a survey asking for your crop estimate and harvest strategy for the 2020-21 season. Included in the survey was a request for an accurate canopy hectare measure of your orchard, this is to ensure more accuracy around production/canopy hectare. Do get in contact with me if you require assistance with crop estimate.

LOCAL MARKET
The local market has had a steady inflow of fruit keeping strong and stable value throughout the last few weeks right up until lock down. On Friday 27 March, Zeafruit advised growers with late local market fruit to hold off harvesting for a week; however, please keep in contact if you do have fruit still to be harvested as we will be watching sales in the coming weeks and respond with harvesting when it picks up again. We can work closely with Zeafruit and help with decision making on your harvest strategy through this very unpredictable time.

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WHAT TO DO IN AUTUMN
Autumn is natures time for planting. If you are planning to plant out conservation areas in your orchard, the best time to do this is once the autumn rains start. Planting native species helps support soil erosion, nutrient and moisture runoff and provide native species with food and habitat.

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Remember to support beneficial species around your orchard throughout the cooler months by leaving areas to flower providing habitat and food so populations are supported leading into next season.

SOIL AND LEAF TESTING
Once moisture levels allow, soil and leaf testing can go ahead; however, this is on hold during lock down level 4. Hills Laboratories only has a skeleton crew working and their priorities are focused on testing for human and animal welfare and essentials services first including feed and fodder testing, hydroponics and crop harvest testing - with soil and leaf testing being behind these. They do warn there will be a lag time if soil and leaf samples are sent through due to them not being high priority. We will send a message out via our email update when this lifts and get testing underway again.

2020 – 21 SUPPLY AGREEMENT
I will be contacting Bay of Plenty growers in the coming months with our grower proposal for supply for the coming season. It's hard to predict what our movements will be in the coming weeks with COVID-19 but if we can't meet up face to face we can still have a catch up over the phone with any questions or queries and we are working on having the proposals sent out electronically so this shouldn't affect us too much at this stage.

LIVE STREAMING OF WORKSHOPS
A big thank you to all growers getting involved in our on-orchard and online streamed workshops. We are dedicated to improving the effectiveness of communicating technical information to all of our growers, the best way for you to take advantage of that is for growers to get involved and either attend the workshops or join our online workshop community. So far it has been received extremely well from growers and is proving very successful. A big thank you to Erica Faber and Midge Munro for going ahead with filming the March pruning workshop as we had planned to ensure we get one final communication out to growers the day before lock was enforced. Great work team!


Just Avocados have been live streaming technical workshops via Facebook Live since January

I wish you and your families a very healthy and safe few months ahead, mental health is just as important as physical health, please give any of our team or myself a call even if its just for a chat. Take care and stay safe. ●

ORCHARD MANAGEMENT WITH ERICA

PHYTOPHTHORA ROOT ROT CONTROL

This year, more than ever, due to our exceptionally dry summer, I feel we will need to be even more diligent with regard to Phytophthora Root Rot control. If your orchard is not under irrigation—as is the case for most of our growers—then the dry summer has had a significant impact on root growth and mass. The severity of which will depend on your mulch layer, orchard environment and nutrition programme.

With very dry soils, many roots begin to dry out and shrivel causing root mass shrinkage. Remember that roots do constantly die back and regenerate but with extremely dry soils the regeneration of new roots can't keep up with the root dieback. The drier than usual soils over summer would also result in less uptake of solid fertiliser. This means going into winter we have trees with both a root and nutrition deficit so to speak and so the cold, wet winter soil conditions and effects on root health will be more significant. A heavier crop load and / or flower bud intensity will also add stress to the tree and we all know through COVID-19 that a host, be it person or plant, with compromised health or additional stress will be more susceptible to disease!

As we have had many new faces to our grower group and some new to avocados, let's first recap what Phytophthora Root Rot (PRR) is …

Phytophthora root rot?
Phytophthora Root Rot is a disease that affects close to 5000 plant species across the globe and is the most serious avocado disease world wide limiting production.

PRR is the result of root infection caused by a soil-borne oomycete, Phytophthora cinnamomi (Pc).

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After infection by Pc, the feeder roots start to decay and turn black and brittle as the root tissue rots - giving rise to the name Phytophthora Root

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Rot. This restricts water and nutrient uptake by the roots and leads to branch-dieback, tree decline, and if left untreated or is severe enough, eventual tree death.

The visual symptoms of a tree with PRR include small, pale green or yellowish leaves that often appear wilted during high temperatures. The canopy is sparse and as branches die back and leaves defoliate, the fruit and branches become exposed to sunburn. The severity of the outward symptoms depends on the balance between feeder root death and feeder root regeneration.

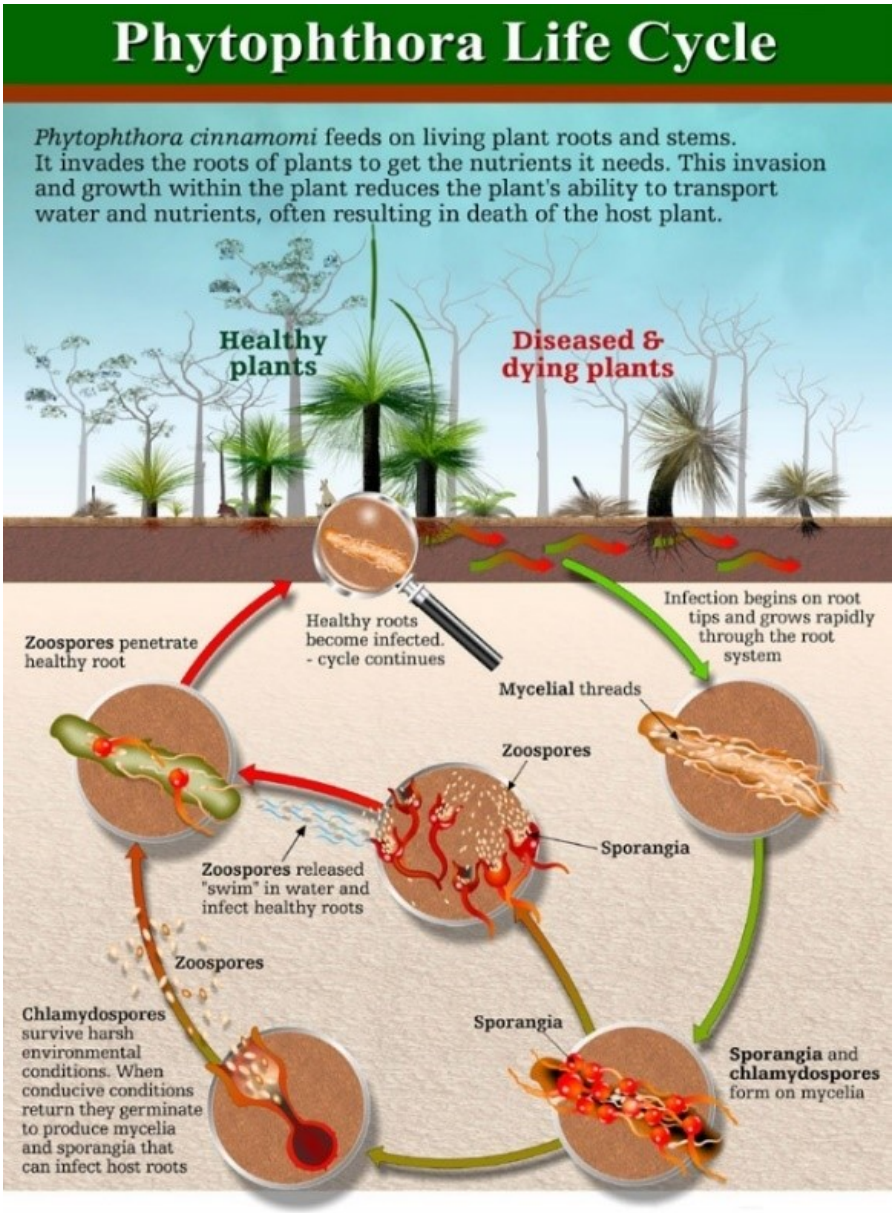
Often these stressed trees set a heavy stress crop but it is of little worth as the fruit remain small and with a sparse canopy are exposed and become sunburnt. The exposed branches also become sunburnt which exacerbate the tree decline even further as the damaged cambium cannot translocate water and nutrients efficiently.

Phytophthora cinnamomi
In order to control Phytophthora root rot, we must first have a thorough understanding of the disease. *Phytophthora cinnamomi*, the cause of PRR, is not a fungus although much about its biology and life cycle is fungus-like. It belongs to the group of micro-organisms known as water moulds or oomycetes, which are related to algae. Water moulds were once included in the fungi kingdom and, as a result, *Phytophthora cinnamomi* has been incorrectly classified as a fungus in earlier years.

As the name water mould suggests, it requires moist conditions to thrive. Zoospores swim in the soil water and in this way find and infect the roots - its food source, until the whole root system is destroyed and the plant dies.

Phytophthora root rot grows as microscopic sized filaments (mycelium) within the host plant's roots. It consumes the root tissue causing lesions (areas that appear rotten). This weakens or kills the plants by reducing or stopping the movement of water and nutrients within the plant.

During conditions that are unfavourable for *Phytophthora cinnamomi* to survive or flourish, i.e., when there are no hosts to infect or soil conditions are too dry to spread, two types of thick-walled resting spores are formed: chlamydospores and oospores. Both can survive for several years. This resilience of these chlamydospores



and oospores, contributes to its persistence in soils and difficulty to control.

CONTROL STRATEGIES
In order to manage PRR effectively an integrated approach of cultural and chemical control as well as rootstock selection needs to be adopted. If you are using chemical control alone, you are only treating the symptoms and not changing the conditions under which *Pc* is thriving.

Rootstock selection
The use of tolerant rootstocks to control Phytophthora root rot is proposed as being the ultimate method for managing this disease. Research on developing *Pc* resistant or tolerant rootstocks has been a major focus of avocado research worldwide.

Since the early 1950s, researchers have scouted for avocado trees surviving Phytophthora root rot. These selections, are subjected to rigorous screening and eventually placed in field trials throughout the world, in infested orchards. In these field trials other characteristics such as yield, nutrient uptake, excessive vigour, scion and rootstock compatibility and overall tree performance are also monitored.

Due to the genetic variability of seeds, the only way to retain the resistance or tolerance and characteristics of these rootstock selections is to propagate them clonally. The predictability of genetically uniform, root rot tolerant, productive trees is a distinct advantage over the variability of seedling rootstocks.

Using a rootstock that has a high tolerance to *Pc* eg : Dusa, is the most effective and easiest control strategy

Cultural Controls

Site Selection
If you are wanting to plant avocados,

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the most important consideration is site selection. Root rot thrives in poorly drained soils as these saturated soils not only provide a perfect environment for spore release and dispersal but are also not favourable to plant growth and can predispose plants to infection. Well drained, fertile soils with good organic matter content and balanced soil microbiology will ensure healthy root development and natural suppression of the disease. Poor drainage can be improved by planting on ridges, installing drainage or deep cross ripping. Soil layers such as hardpans also impede drainage and often allow free water to accumulate above the hardpan. Preventing excess soil compaction or deep ripping these areas can also help to improve water drainage.

Certified disease-free trees

Only buy certified disease-free trees from registered, certified avocado nurseries. By planting trees that are already infected with Pc, not only will you infect your orchard but you will be fighting a constant battle against the disease.

Limit the spread of the disease

PRR is not only spread through water and root-to-root contact between trees but also spread through infected soil, especially by vehicles and even footwear. Ensure there is no water runoff from areas with diseased trees to healthy trees. When working with tractors or hydra ladders, work in the most diseased areas last. Sanitise implements regularly e.g. disinfect your spade with dilute bleach solutions between holes when interplanting in an already established orchard.

Soil solarisation

Prior to replanting where a diseased tree has been removed, soil solarisation can be effective for treating infested soil. Leave the new planting hole open to the sun or cover it with plastic polythene sheeting.

Root health

Roots are important plant organs. They absorb water and nutrients from the soil and translocate them to the rest of the plant. Roots also give mechanical support to plants and synthesize growth substances and hormones that affect many processes associated with growth and production.

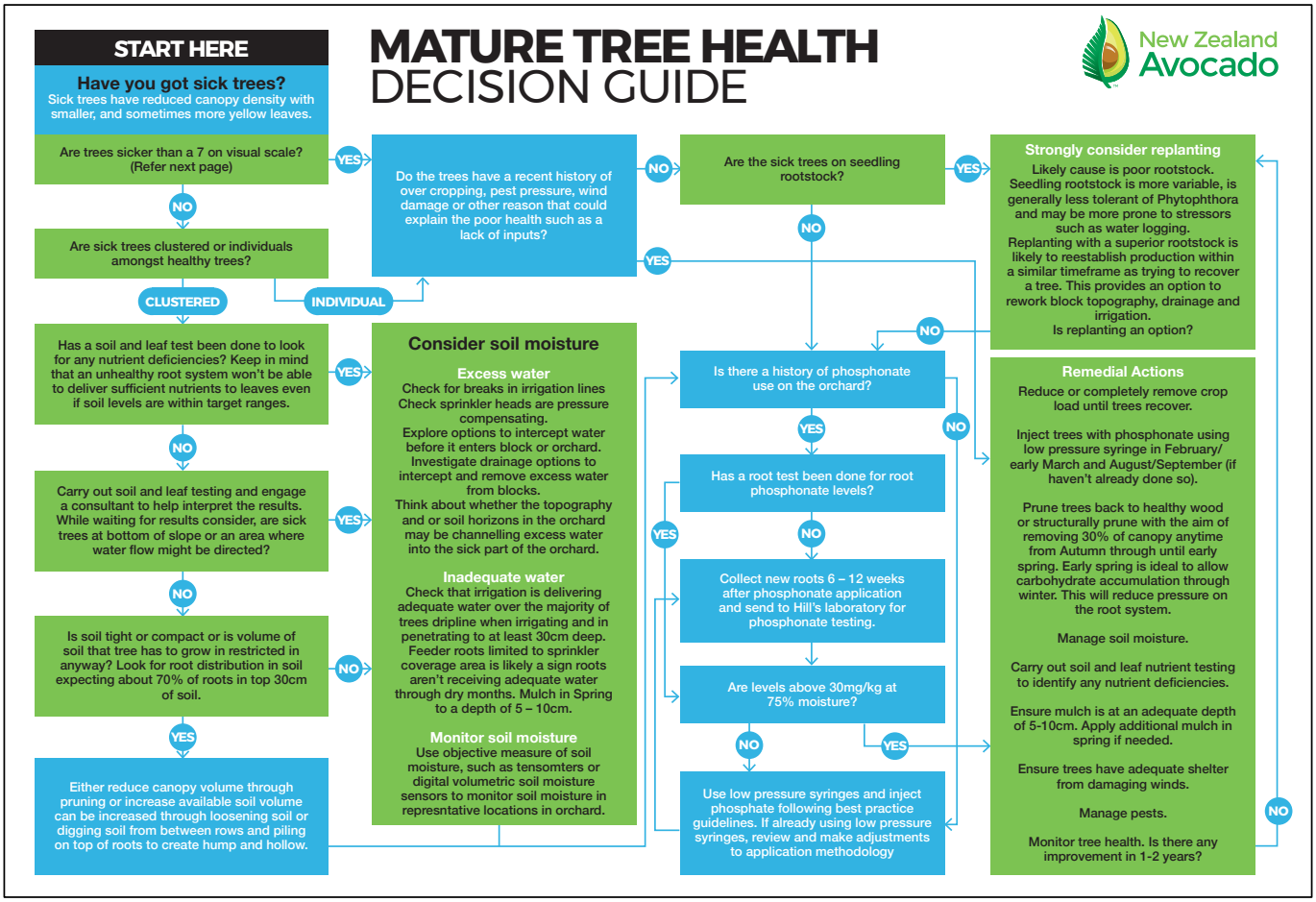
Because roots are out of sight, they are often out of mind and are widely overlooked for their significance in plant health. It has been estimated that 80% of all plant problems start with soil/root problems.

A successful strategy is to protect plants from yield-reducing diseases by enabling development of healthier, stronger root systems through management and treatments, thereby helping plants grow to their maximum potential. Maximizing yields therefore starts and ends with a healthy root system.

When there is an overlap of roots from different plants (including grasses and weeds) the roots with the most surface area wins. It is therefore important to ensure that there is no competition from grasses and weeds.

There is an interdependence of shoots and roots for growth and development. The shoots rely on the roots for water and nutrients, while the roots depend on the shoots for carbohydrates and photosynthates. Therefore, anything that interferes with photosynthesis, or transport of photosynthates, will reduce root growth. Such factors may include cold damage, sunburn damage, inadequate nutrition, leaf pathogens and mechanical or insect-related damage to the canopy.

Mycorrhizal fungi excrete powerful chemicals that dissolve mineral nutrients, absorb water, retard soil pathogens, and glue soil particles together into porous structure. In return, the mycorrhizal fungi receive sugars and other compounds from the roots to fuel mycorrhizal activities.



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Both plant and fungus benefit from this "symbiotic relationship". Applications of Mycorrhizal fungi are therefore beneficial in maintaining a strong and healthy root system.

Root health and soil fertility remains a relatively low priority for growers yet in order to maximize plant performance and yields we need to look beyond just soil pathogens!

Organic matter

Increase organic matter e.g. mulches and composts to enhance biological suppression of *Pc*. This will create an active and diverse microflora. Composted bark increases the air-filled porosity of soil, releases inhibitors as it decomposes, and allows antagonistic soil fungi such as Trichoderma sp. to build up. Mulching also stimulates plant root growth, increases nutrient uptake, decreases evaporation from the soil, increases soil-water holding capacity, reduces surface water run-off, facilitates drainage, regulates soil temperature, and provides a high level of nutrients for soil microbes. Soils with high organic matter generally support higher numbers of bacteria, fungi and actinomycetes and contain higher percentages of micro-organisms antagonistic to Phytophthora. Soil micro-organisms use soil organic matter as food so in order to maximise their benefits that improve root growth and function we need to ensure that we maintain their food source by supplying a continued source of organic matter. It is as important as fertiliser!

Biological fungicides

Use of biological fungicides such as certain *Trichoderma* is a key constituent of integrated pest management. *Trichoderma* actively grow on roots and "protects" them from *Pc*. They compete with plant pathogens for nutrients and space, by producing antibiotics, by parasitizing pathogens, or by inducing resistance in the host plants. The ability of these fungi to sense, invade, and destroy other fungi has been the major driving force behind their commercial success as biopesticides. Trichoderma defend the plants by their direct and indirect effect on plant-pathogen-soil interaction. These fungi not only protect plants by killing pathogens but also induce resistance against plant pathogens, impart abiotic stress tolerance, improve plant growth and vigor as well as improve nutrient uptake.

Water management

If irrigating, controlled, regulated use thereof is one of the most critical practices for managing *Pc*. This includes both the amount, frequency, and duration of irrigation as well as control of the runoff. Phytophthora species generally require free water for a certain duration in order to infect plants. They are not active until the soil is at or above field capacity. In other words, when water does not move down through the soil with the force of gravity. Soil moisture meters are an important management tool to monitor tree water withdrawal and field capacity and to schedule irrigation only when necessary. Over irrigation or not adequately allowing the soils to dry out between irrigation will favour conditions in which Pc will thrive. Also, remember to modify irrigation on trees with a poor health rating or trees defoliated by frost, Pc or mites. When interplanting in established orchards, reduce irrigation to the smaller trees by using a micro sprinkler reducer or changing to an emitter with lower water output.

Regularly check for leaks in the irrigation system that will result in saturated areas prone to Pc infection. Phytophthora can also contaminate irrigation water. Ensure that either your water source is tested and is free from Phytophthora and Pythium or install a dosatron to treat the water chemically.

Nutrition

One of the fundamental strategies for maintaining plant health and suppressing plant diseases is managing nutrition. Proper nutrition can often influence the fine line between host susceptibility and resistance. Plant pathologists refer to the "disease triangle" to illustrate the components needed for disease to occur. Equal importance is given to all three. Altering the balance will affect whether the disease occurs or the severity of the disease. Complete and balanced nutrition is a powerful tool against Phytophthora. Applying

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foliar nutrients can make up for loss of nutrient uptake due to root rot or when there are other constraints affecting uptake e.g. inadequate soil moisture.

Chemical controls

Phosphonate fungicides can improve the tree's ability to tolerate, resist, or recover from Phytophthora root rot infection but cannot eradicate the disease. They can prevent establishment of the organism before it gets into the plant or prevent continued growth if the organism is already inside the plant. The result is that they can delay symptoms that might have developed by the combined effects of direct inhibition of the pathogen and enhanced host defence responses. Once chemical activity has subsided over time however, Phytophthora once again resumes growth within infected roots. This is why an integrated approach to managing Phytophthora is so important.

It is important to time the application of phosphonate accurately in order for the concentration in the roots to be high enough and effective in controlling the disease. When any chemical is applied to the tree it sinks to the part of the tree that is growing most actively at the time (the strongest 'sink'). If the leaves are flushing the phosphorus acid will sink to the leaves and not the roots. Good levels of phosphonite in the roots are achieved by following the phenological cycle and timing injections or sprays to coincide with when root growth flushes are occurring.

There are two main root flush periods, one after the spring leaf flush has hardened off and one in autumn after the summer leaf flush has hardened off.

There is only a small window of opportunity in spring as fruit growth occurs soon after the root flush and the phosphonate will mostly sink to the flowers and any sizing fruit. Research and phosphonate root analysis has shown that the best results are from the autumn applications made after the summer flush has hardened off and when competition from other organs are no longer dominant.

The autumn application if timed correctly also ensures that there will be root protection for a longer period i.e. when healthy roots are required to support the critical flowering period – a time when significant stress is imposed on the tree. Autumn applications can result in high phosphonite root concentrations which should persist, remaining above the 25-40ppm threshold of effectiveness, until the following autumn. Do not do any phosphonate application during dry weather or when the trees are water stressed. Wait for good soil moisture levels or irrigate well before application to get better uptake as treatments are always more effective when applied during periods of active sap flow. During warm to hot weather, treatments should be applied before 10am. If any trees earmarked for phosphonate application are going to be pruned, wait 3-4 weeks after application to commence pruning to allow the chemical to be drawn up by the leaves and translocated down to the roots.

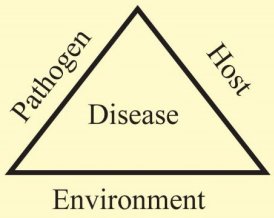
Disease Triangle

For any plant disease to happen, three factors must be present and conducive for disease.

1. the Host - Consider what is its condition resistance, predisposed, or age?

2. the Pathogen - What is the condition of the pathogen, virulence, domant, population? What environmental conditions does it require?

3. the Environment - The environmental conditions include:
- **For foliar diseases - moisture & temperature**
- **For soil diseases - temperature, pH, compaction (plant health, O_2), texture for nematodes**



> **" In order to manage PRR effectively an integrated approach of cultural and chemical control as well as rootstock selection needs to be adopted. "**

If choosing the injecting method, space syringes evenly around the base of the trunk avoiding the vicinity of old injection sites. Generally, you can work on spacings of a hand width apart (10-15cm) or one syringe per metre canopy diameter. Spacing the syringes correctly is important as the chemical does not move laterally around the tree and only moves to the leaves directly above the injection site then back down to the roots below them. If injecting is not done properly, some of the root system will therefore not be protected.

To recap: there must be adequate soil moisture, the summer leaf flush must be hardened off, there must be a good proportion of healthy roots and the roots must be actively flushing for control to be most effective.

Monitoring root phosphonate concentrations by taking root samples before and following phosphonate applications, are as important as monitoring soil and leaf nutrient concentrations. If we are not measuring, we cannot manage effectively or improve on what we are doing! Group similar trees together into a composite sample. 10-50g of healthy roots are required per sample. Aim for phosphonate root concentration of 25-40mg/kg which is considered the threshold of effectiveness for NZ.

Foliar spray application can be effectively utilised when the trees have sufficient canopy to take up the chemical. Foliar sprays of 0.5% ammonium phosphonate or potassium phosphonate (Phosguard) can be sprayed in Autumn once the summer flush has hardened off. Depending on the existing root phosphite concentrations and the severity of the disease, 1-4 foliar sprays may be required. This quick easy, non-invasive method has been outperforming injecting in research trials since 2015 with results showing higher root phosphite concentrations.

You may opt for a combination of both chemical methods depending on your tree health and just elect to inject the poor health trees that do not have sufficient canopy volume for uptake of the foliar applied phosphonate.

For young trees (0-4 years) I prefer to use a Ridomil or Terracin drench or/ and an Aliette foliar spray.

Remember, any chemical control for Phytophthora will affect beneficial microbes as well so follow up 3-4 weeks later with biostimulants such as Mycorrcin etc.

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Phosphonate application rates
Label rates can be confusing and rates and recommendations are different in different parts of the world making it even more confusing. Remember that there is also a dilution effect depending on the canopy size and root mass percentage. Imagine 1L divided into 100 cups versus 1L divided into 10 cups. The concentration will be higher in the 10 cups. If we visualise the canopy volume on a large healthy tree with many thousands of leaves and lots of roots you will understand that the dilution affect is greater compared to a "bony" tree with sparse canopy and root mass. This correlates with root testing results where you often find higher levels of phosphonate in the sick trees or phytotoxicity symptoms expressed with chemical burn on the leaves. I have found however that the following is a good guide to follow:

20ml solution per syringe

Medium age healthy trees (5 – 10yrs): 15% ai

Old healthy trees (10yrs +): 15% ai

Medium sick trees: 7-15% ai (lower rate depending on tree health and risk of phytotoxicity)

Old sick trees: 10-15% ai (lower rate depending on tree health and risk of phytotoxicity)

FOR 1L of 40% STOCK SOLUTION (Active Ingredient : 400G/IL)		
CONCENTRATION	**AMOUNT OF PRODUCT**	**AMOUNT OF WATER**
7% AI	175ml	825ml
10% AI	250ml	750ml
15% AI	375ml	625ml

FOR 1L of 60% STOCK SOLUTION (Active Ingredient : 600G/IL)		
CONCENTRATION	**AMOUNT OF PRODUCT**	**AMOUNT OF WATER**
7% AI	120ml	880ml
10% AI	166ml	834ml
15% AI	250ml	750ml

New Zealand Avocado has recently created a decision guide on what actions to follow when managing tree health. This follows on from their "Tree Decline and Tree Health" research trial. This handy resource along with the Ciba-Geigy scale for plant disease rating (rating ranges from 0 (healthy) to 10 (dead)) also included here will help you in your decision making when managing tree health.

For any further assistance on managing tree health, contact your Just Avocados rep. We are here to help and support you on your journey in improving orchard health and productivity. Remember if COVID-19 has you locked down, the Avoworks team is out continuing with essential work in keeping your orchard healthy and productive to ensure a good season ahead! ●

QUALITY AND COMPLIANCE UPDATE – GLOBALG.A.P.

As signalled in our e-bulletins in February, there are changes coming this season with our transition from NZGAP to GLOBALG.A.P..

We will be working with growers to transition to this certification before the start of exporting in 2020. Our focus is to assist you where possible and ensure you are well prepared to consistently meet your certification

Definitions:

- ***GLOBALG.A.P.*** *- Good Agricultural Practice*
- ***GRASP*** *- GLOBALG.A.P. Risk Assessment on Social Practice*
- ***PMO*** *- Produce Marketing Organisation*
- ***MSO*** *- Management System Owner*
- ***MPI*** *- Ministry of Primary Industries*

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requirements for the market standards with confidence.

We are currently developing a checklist of the changes and will make this available to growers as soon as possible.

Just Avocados Ltd is able to operate as a PMO under the GLOBALG.A.P. system, meaning our growers (MSO - Management System Owner) are registered with GLOBALG.A.P. through us.

Under this scheme, a sample of growers are audited each year against the requirements—which is a much more cost-effective scheme for a grower than being independently registered and audited.

Background
Our global retail partners are demanding increasing levels of certification in regards to the delivery of safe and reliable product that has been produced in accordance with Good Agricultural Practices. Just Avocados up to this point has certified growers to meet these requirements under NZGAP; however, from the coming 2020-21 season, this standard will no longer be accepted and we will be working under the GLOBALG.A.P. standard.

Going forward
Just Avocados is committed to providing a safe and reliable food safety system to our customers throughout the world. To achieve the required level of grower food safety compliance requirements, the GLOBALG.A.P. (Good Agricultural Practice) and GRASP (GLOBALG.A.P. Risk Assessment on Social Practice) certification along with applicable New Zealand legislation shall be implemented and consistently met.

Annually, Just Avocados Ltd (the PMO - Produce Marketing Organisation) is required to advise our international customers of the orchards (MSOs - Management System Owner) that are GLOBALG.A.P. and GRASP certified. There are two ways this can be achieved:

- Independent Certification (Option 1) MSO's are independently audited each year by an accredited certification body such as Assure Quality or SGS. An MSO may choose to be audited under Option 1 if they require certification for multiple crops.
- Group Certification (Option 2) Just Avocados is able to operate as a PMO. This allows internal inspectors from the packhouse to inspect MSOs. The nominated certification body (Assure Quality or SGS) then audits a sample of growers (MSOs) equivalent to "the square root" of MSOs from the group each year. This is a more cost-effective way of obtaining certification for growers.

MSOs will be provided with a Just Avocados Grower Manual which will include revised Policies, Procedures, Risk Assessments, Management Plans and other resources that will assist you with your new certification requirements for GLOBALG.A.P. and GRASP. ●

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FEATURE

CHALLENGING THE STATUS QUO ON AVOCADO GROWING

Midge Munro - Group Communications Manager, Darling Group

Andrew Davenport and David French are two avocado growers who have said "no more" to poor packouts caused by wind damage. Both have embarked on covering their entire orchards with shade netting; a brave project with large capital outlay which both believe will pay off.

The main aim, generally, for an avocado orchard is to have a profitable business aided by the production of exportable avocados of a certain size, free of blemish, and of a certain profile to meet market demands. The ability to achieve this is influenced by a number of factors – some we can control and others such as wind we cannot control so easily – or can we?

Full net cover for orchards is a practice that has been long used in other crops such as kiwifruit to create a microclimate and protect fruit from adverse weather. We are now seeing the emergence of this type of protection in avocados.

A 2016 study conducted on Carmen Hass in South Africa using a 6m high shadenet structure, with 20% white shadenet over the roof and 40% green shadenet on the sides found that "Fruit reached minimum maturity two weeks earlier under shadenet compared to the open treatment. Fruit quality and pack-out were improved under the shadenet due to reduction in sunburn, wind damage and small fruit."[1]

Data shared by Westfalia at the 2019 World Avocado Congress in Colombia on trials conducted from 2017 to 2019 in South Africa showed significant benefits of full net cover versus open field. They observed greater fruit size, a reduction in wind damage on fruit, and an increase in the percentage of Class 1 fruit (increased fruit quality).

Just Avocados is in contact with two growers who have embarked on using this innovation on their orchards – David French in Waiuku and Andrew Davenport in Katikati. The idea to go ahead with this method was borne of their shared frustrations of growing fruit that becomes damaged by the environment.

"I am wanting a higher crop, a more consistent crop and I am wanting a better-quality crop," says Andrew Davenport.

Both Andrew and David believe that full cover canopy is an investment in the profitability of their orchard and a way to effectively mitigate the effects of a number of environmental factors.

"Avocado is a difficult product and is hit by the environment all the time – if it's a bit chilly at fruitset – no fruit, if you have a big wind come through, your

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Davenport's Katikati orchard under full net cover completed February 2020.

Fruit is blown off, and if it is blowy weather you get wind rub." Says Andrew.

"I hate the fact that I grow fruit that gets rejected, it costs to grow it, it costs to pick it and it's being binned, why would you want to waste money like that?"

Reducing the effect of factors that impact the amount and quality of the crop such as temperature and wind were the drivers for Andrew to go ahead with a full cover canopy.

"Under a canopy, it's more humid in there and reduces UV by 20% - trees and fruit suffer from sunburn."

Andrew believes that the canopy will mitigate effects of sun, wind, cold temperatures.

"I think the benefits are increased daytime temperature which is especially relevant in spring when we have fruit set, less wind rub, less windfall, and higher humidity.

"You put all of those environmental impact issues into a box and work on reducing them and surely I have a better chance of getting ahead.

"I can't have a business that gives me money one year and nothing for another two."

Andrew says the idea to cover his entire orchard came completely off the top of his head.

"I was chatting with a fellow avocado grower about avocados and all the problems it has and mentioned why not put a roof or net over it like you see in kiwifruit?"

Andrew engaged NetPro who began construction to cover his 10-acre orchard at the end of November 2019 and completed the structure in February 2020. The net canopy is sided the entire way around and is offset from the perimeter of the property by 1m – maximising usable area while also giving access to the outside of the canopy.

Not only has this structure been created with the intent that it will benefit production and quality of fruit but it also has the benefit of creating more space for planting. Andrew has taken this opportunity to increase tree numbers and also take the orchard to a higher density.

"Originally we had 500 trees. We have taken out the shelter belts so we have increased the area we can use – there is no shelter around the outside or through the centre. We have just planted 560 more trees, we have another 300 trees to do in spring 2020 and we will have tripled the number of trees more or less by the time we are finished."

Originally the orchard was planted at 7m x 7m. Andrew has planted in between these original rows and where there used to be shelter, resulting in 3.5m centre.

The canopy uses white cloth on the top and green on the sides due to council restrictions around visual pollution. The structure is 7m high and Andrew says he will let trees get to 5m as a maximum. The 2m gap providing flexibility for pruning and air flow around the tree.

"I don't know any other horticultural industry which has big trees, oranges grow very big, apples grow, very big, pears grow very big but no one has them very big – only avocados. I'm going for a hedge effect with small trees.

Its early days, but Andrew has made some observations on the effect of the canopy.

"The grass inside the canopy is very green and we are not irrigated, also the growth on the old trees that received a very heavy prune has been phenomenal."

Andrew says his only worry about the canopy is with the bees and being fully contained inside the canopy." The beekeeper will be experimenting with me this spring."

Waiuku avocado grower, David French began the construction of his net canopy in in February 2020 with Katikati company Windshadow.

"10 years ago I went down to Hawkes Bay on an orchard trip and saw a guy covered his kiwifruit, I came home and decided I would try covering half of my kiwifruit which I did about seven or eight years ago then two years ago I covered the balance of my kiwifruit so obviously I thought it was working for me.

French's Waiuku orchard with partly completed canopy.

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David then considered the idea of covering his avocados but didn't quite have the information or the nudge to go through with it until some research was shared at the World Avocado Congress in Colombia last year.

"One of the speakers [Wilna Stones from Westfalia] gave a presentation on their experience of covering 2-3 orchards in South Africa and the benefits were bigger fruit, more fruit and better-quality fruit, so volume, size – everything was a benefit really," says David.

The final catalyst was at a Just Avocados field day.

"Andrew [Darling] made a comment that one thing he was sick of as a grower was having good fruit getting blown off in strong winds year after year and so I said, Andrew, the winds are not going to change, if we want to do something about it we will have to change what we do. After that I went home, called the guy who had done my previous lot, got a quote and decided to do it."

David's packout report was also good

Davenport's structure is 7m high and makes maximum use of available space by the Side netting sitting 1m off the boundary.

French's Waiuku orchard with partly completed canopy.

motivation for going ahead with the canopy.

"I got my packouts back from Just Avocados and 80% of my rejects were wind related and I thought this is just bloody nuts – you go to all this trouble to grow fruit and then 80% of your second grade is rejected because of something you could improve."

David has removed all of the internal shelter but unlike Andrew Davenport he has retained the perimeter shelter for privacy. He has also used white cloth on the top and all the way around.

Extra space created from the removal of shelter has allowed for 80 more trees to be planted within the orchard.

David's project is currently on hold (April 2020) because of the COVID-19 level 4 lockdown but he hopes to have it all wrapped up come spring.

When finished, the structure will cover 3 hectares (60% of David's 5 hectare orchard), at a height of 6.5m.

"My irrigation is approx. 5.5m off the ground on a pole and I will prune the trees to that height. We would not want to allow any structural branches to get beyond 5.5m," says David.

As for the cost, this is significant but David estimates it could be as little as a three to five-year payback in his situation.

"The structure itself and the labour works out to roughly $70K per hectare and then we had to remove the shelter so by the time you have done all that it works out to $75-80k per hectare.

David believes the construction of the canopy will result in significant benefits for his crop.

"Avocados is such an up and down crop that if this contributed to reducing the biennial bearing nature and gave me a more healthy tree year-in-year-out, the benefit percentage wise might actually be better (than the benefit to covering Gold kiwifruit) and when you consider that 80% of my rejects is wind rub – if I can reduce that even by half."

David says that he does not think the canopy will eliminate all wind damage but hope it will significantly improve this issue he also thinks the biggest benefit will be at flowering.

"You are going to have warmer temperatures at flowering and less of that pounding wind. It will not eliminate wind; it just moderates it."

Unlike Andrew Davenport, David is leaving a 50m x 50m corner of the canopy open permanently to allow the free travel of bees in and out.

"This section is out of the prevailing wind, the plan will be to put the bees directly below that and they will have the option to go into the paddock or into the canopy. I will also bring in bumbles as well."

BENEFITS AND CHALLENGES

Erica Faber - Technical Manager, Just Avocados

Growing crops under shade netting is certainly not new within the horticultural industry which is why Westfalia in South Africa initiated research trials in 2013.

One of the trial sites is at Everdon Estate which is situated in the Midlands of Kwazulu Natal. This has a cool climate with their fruit maturing around three months later than the warmer northern regions of South Africa. The environmental and climate conditions are similar to what we in New Zealand experience with the same challenges and similar phenological time frames. It was great being able to be on site and experience the Everdon trial first hand.

Benefits:

- In all trial sites and conditions, pack outs improved by up to almost 30% with regard to wind damage.
- The reduction in solar irradiance not only mitigates sunburn damage but also reduces evapotranspiration and has a positive effect on soil water and nutrient availability. Less water stress will result in improved plant growth and yield.
- Air and canopy temperature under shade netting is also higher which has a further benefit over flowering phenology and pollination with

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improved bee activity observed.

- Not only is fruit quality improved resulting in higher percentages of exportable fruit but fruit maturity was also observed to be about two weeks earlier in many instances most likely attributed to the increased temperatures and earlier pollination.

Challenges:

- Higher pest pressure due to the microclimate which means being more meticulous with regard to pest monitoring and sprays.

- Over pollination, bee mortality was reduced by opening up the northern side of the shade netting allowing the bees to orientate themselves.

- Some sprays, Copper in particular, will also have an effect on the shade netting resulting in a shorter life span or perhaps interfering with light penetration.

The success of these trials is conclusive enough for this way of growing to definitely become something we will be seeing more of in our industry. Growing under shade net however will require different management and planting styles. Due to the expense and lower tree canopy required, high density plantings will need to be undertaken to warrant the expense and ensure the planted area is as profitable as possible. Which is why I recommended increasing the planting density of the Davenport orchard.

With higher planting densities comes critical pruning management which will also ensure renewal of fruiting wood and increased production in the long term.

An exciting space to watch as we "diarise" the successes and challenges on David French's orchard and on Andrew Davenport's orchard.

NETPRO CONSTRUCTION

Netpro Construction is a New Zealand company based in Katikati. Owners Wayne Russell and Samantha Ogden have over 30 years' experience in the netting industry covering many different crops throughout New Zealand and overseas.

While covering avocados is a relatively new project at Netpro, in New Zealand and Australia they are seeing an increase in enquiries from avocado growers.

"Growers are seeing many other crops being covered in their area and are witnessing the benefits - this helps when it comes to making a decision on covering their orchards."

Netpro have covered three blocks in the Katikati area covering over 12 hectares and have another 8 to 12 hectares pencilled in for the coming year as well as enquiries from Australia to cover some large scale production blocks.

"The structures are normally built to a height of 7 metres, this helps cope with the extra growth and pruning that will be required from being in the protected environment. The height also helps with bee movement throughout the block," says Samantha.

Samantha adds that if you are looking at putting in windbreaks to help protect your avocado crop and there is a chance that you may cover it in the future, then you have the opportunity at this stage to contact them and discuss the correct location of the windbreak to work in with a netting canopy possibly being done in the future.

"This will save money and time as all we have to do is add on to what is in place."

Samantha says that the benefits to avocados of a covered canopy are more plantable area from the removal of shelter, more light into the block much earlier and later in the day, reduction of damp areas, increased bee activity, protection from light hail, bigger fruit, earlier crop, lower reject rate, and overall a better growing environment with healthier plants that have no wind damage and a much heavier greener foliage than those outside of the block.

We thank Andrew Davenport and David French for contributing to this article and for their pioneering spirit in taking on this innovation that will pave the way for others to learn from their experiences. We admire their commitment to their individual projects and their approaches to their avocado businesses.

Thank you both for allowing us to "pop our heads in" and learn from you and share this with others. ●

[1]C.K Malapana, Microclimate modification to improve productivity of 'Carmen®-Hass' avocado orchards using shadenet under subtropical conditions of Limpopo province, South Africa., University of KwaZulu-Natal Pietermaritzburg, South Africa.