

Sun shining on citrus

Page 4



In this issue

10 Pathways for
young growers

15 Avocado crop
estimation

16 Future orchard
technologies



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Contents



JULY 2024

Up Front

- 2 The Chief Executive: Crop protection products vital to our sector

Fruit Growing

- 4 Sun finally shining on citrus industry
- 8 Resilience and recovery define citrus season
- 10 Central Otago young grower focuses on education
- 12 Hawke's Bay's up-and-coming growers
- 14 What's new: Charitable organisation provides cherry industry with broken bucket fix*
- 15 Crop estimation in avocados
- 16 Utilising future orchard technologies
- 21 High accuracy GPS to boost tech adoption

- 22 What's new: Reporting capability is significant for growers' business improvement*
- 24 What's new: Partnering in the future of horticulture*

Your Industry

- 26 Leveraging AI to enhance weather forecasting
- 29 What's new: New Cloud-based software solution helps businesses deliver on quality
- 30 Growing data
- 33 Orchards designed for robot/human future
- 36 We love tech - but are we tech leaders?
- 38 Orchard data in the palm of your hand

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FLIP to find more articles about Your Industry

- 32 Will New Zealanders buy our genetically engineered fruit and vegetables?
- 28 Agritech for cropping and horticulture
- 25 Onion health benefits - Global research and opportunities



Flip to find vegetables

This issue of *The Orchardist* offers you another perspective. Flip the magazine to see our sister publication about vegetables - *NZGrower*.



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Crop protection products vital to our sector

When I am out and about talking with growers, one of the key issues raised is access to the right crop protection products to help them grow fruit and vegetables free of pests and diseases.

Nadine Tunley : HortNZ chief executive

The costly and lengthy regulatory approval process to get new products registered for use in horticulture has been a huge drag on our ambitions to double the farmgate value of our industry by 2035.

The Environmental Protection Authority (EPA) is currently grappling with a significant backlog of applications stuck in the regulatory process for new products designed to control pests and diseases in the most sustainable ways.

A recent Sapere review estimated that if the EPA halted all other assessment activity and stopped taking applications, it would still take them 2-4 years to clear their current backlog.

HortNZ and our partners across the supply chain, such as Animal Plant and Health New Zealand, have been advocating for changes to the process for some time.

So, it was great to see the Government announce during Fieldays at Mystery Creek that the Ministry for Regulation will review the complex approval processes for new

agricultural and horticultural products under the EPA and New Zealand Food Safety (NZFS).

So why is this important to growers?



HortNZ is concerned that the approaches the EPA and NZFS are taking to approve crop protection products is leaving the horticulture sector vulnerable with few options to manage pests, diseases and weeds in an increasingly challenging environment.

We know growers are working hard to use more environmentally friendly approaches, including integrated pest management (IPM). The *A Lighter Touch* (ALT) programme, supported by HortNZ, is funding extensive demonstrations with the aim of transitioning from agrichemical pest management to agroecological crop protection.

Ironically, the complex regulatory approval processes and EPA's backlog of applications are preventing growers from accessing products that are more environmentally friendly and sustainable with fewer environmental impacts.



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The individual comments and views in this magazine do not necessarily represent the view of Horticulture New Zealand.

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Crop protection products are vital to horticulture production especially in the more volatile climate environment we now live in.

Without crop protection products, horticulture would lose 75 percent of the value of its crops. Vegetable growers would incur losses of about 88 percent of the value of vegetable crops – 80 percent of vegetables in New Zealand are grown for domestic supply. New Zealanders food security, as well as our economy, is dependent on the crop protection product regulatory system working well.

The HortNZ team is looking forward to providing our advice and expertise to the review led by the Ministry for Regulation.

The outcome we are seeking is ensuring regulatory interpretations of the Hazardous Substances and New Organisms Act and the Agricultural Compounds and Veterinary Medicines Act are not creating unnecessary or unsubstantiated barriers to horticulture's success.

Value of crops without crop protection products:



across all
horticulture



for vegetable
crops

These Acts need to enable growers access to new tools so they can produce healthy fruit and vegetables for New Zealanders and achieve the Government's vision of doubling exports.

Mystery Creek Fieldays was my last as HortNZ chief executive and it was great to catch up with growers, sector partners and politicians. There are a number of challenges facing the agriculture sector as a whole; we can only hope this government will ensure changes being made are enduring beyond election cycles, so we all have confidence to invest in rebuilding not only our businesses but the NZ economy.

According to the latest Situation and Outlook for Primary Industries (SOPI) report released at Fieldays there are certainly good prospects for our sector. It reflects that horticulture will remain a major contributor to the New Zealand economy, so we just need Ministers and government to keep us front of mind and not a poor cousin to the dairy and meat sectors.

SOPI reports that horticulture export revenue is expected to increase 1 percent to \$7.1 billion in the year to 30 June 2024. This has been helped by favourable climatic conditions for most crops recovering from the impacts of the previous wet summers and cyclone damage. Kiwifruit, apples, cherries, and vegetables all saw increases in production.

However, this was countered by weak demand for wine due to high global inventories and a poor season for avocados.

Next stop is the RSE and Horticulture Conferences at Mercury Baypark, Mt Maunganui on 28-30 August.

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Burnside Trust operations manager David Ladd (left) spends his days travelling between blocks to check in with contract pickers like industry veterans Ross Tangoiro (centre) and Kate Jones

Sun finally shining on citrus industry

After a century of working land in the Gisborne region the Ladd family has learned – often the hard way – that diversification in both crops and locations is key to continuing success.

Kristine Walsh

"It's been a rugged three or four years, but some parts of the region have been hit harder than others," says David Ladd, who manages his family's Burnside Trust orchard operation.

"So while we've had some tough losses, we've been lucky enough to keep some blocks and crops working while focusing on remediation for the others."

Citrus and persimmons in particular had coped with a wet 2022 followed by cyclones Hale and Gabrielle in early 2023, then a further ten months of rain and sodden soil.

"The cyclones were challenging but it was the big rains four months later, in June, that had the big impact," David says.



"Last year we were just gearing up to pick Satsuma mandarins on one block but lost the lot ... \$20,000 to \$30,000 gone in one go.

"This year it's a different story. The wet spring leading up to this year did impact on flowering so it's not a heavy crop, but the fruit is clean and the size is pretty good, which is better than we expected."

Building on the legacy of Pātūtahi land bought by Frank and Rosabel Ladd in 1924, the move from bare land to horticulture was made by David's parents John and Valerie when they planted grapes in the late 1970s, soon followed by kiwifruit.



After last year joining the team of contractors that services Burnside Trust orchards, Love Singh (right) and Sean Collier are developing skills that will help them work across product groups

Since then, Burnside Trust has developed an operation over 70 hectares – owning 40 of those while sharecropping the rest.

And they're busy across all seasons managing plantings of citrus, apples, persimmons and kiwifruit, with multiple varieties within each product group.

As a member of the fourth generation of Ladds to farm land around Gisborne, David brings decades of experience to the orchard operation.

“

The wet spring leading up to this year did impact on flowering so it's not a heavy crop, but the fruit is clean and the size is pretty good

“Growing up I was involved with cropping on family land, and when I left school I worked with companies like Cedenco, Judco and LeaderBrand,” he says. “So I've been involved with growing stuff my whole life.”

In the early 2000s – while in his mid-20s – David headed off for his OE and got stuck into building work in the United Kingdom.

A couple of years later the call came: John and Valerie wanted to switch things up and hoped he'd come home to help them.



Horticulture New Zealand Notice of the 19th Annual General Meeting

Friday 30 August 2024, 8am at Mercury Baypark, Mt Maunganui, Tauranga.

Business

- 1 Welcome and Apologies
- 2 Voting and Proxies
- 3 Obituaries
- 4 Approve Minutes of the 18th AGM
- 5 President's and Chief Executive's Report on HortNZ's Activities
- 6 Approve Audited Financial Statements for year ended 31 March 2024
- 7 Review of Constitution
- 8 Levy Rate
- 9 Director Remuneration
- 10 Approve 2024/25 Budget
- 11 Approve Auditors for 2024/25
- 12 Notices of Motion
- 13 General Business

Call for Notices of Motion

Any Board Member, Affiliated Organisation or Active Grower Member wishing to have a matter considered at the AGM must give notice in writing to the Chief Executive of Horticulture New Zealand of the notice of motion no later than Thursday, 11 July 2024 at 10.00am. Notices should include the wording of the motion to be voted on and up to one A4 page of explanatory notes. Notices of motions will be listed on HortNZ's website www.hortnz.co.nz on 18 July 2024 and will feature in the HortNZ magazines (August issue).



David Ladd (foreground) might manage the family's Burnside Trust orchard operation, but his parents John (on tractor) and Valerie Ladd still like to keep their hands in

100 YEARS OF FAMILY GROWING

Burnside Trust was founded in just one block – at Knight's Road in Pātūtahi – bought in 1924 by David Ladd's great-grandparents, Frank and Rosabel, and used mainly for stock.

In 1949 their son John (Jack) Ladd and his wife Molly moved onto a portion of the land, but it remained unworked as Jack – a bit of a local character – focused on his work as a mechanic.

Some 30 years later Jack and Molly transferred their parcel of land to their sons John and Barry.

But with Barry headed for the West Coast it was up to John to develop the block, first with grapes (1978)

followed just a couple of years later with pioneering plantings of Hayward kiwifruit, after which John's wife Valerie bought out Barry's share of the block.

Though faced with trials, from grape disease and gluts to Cyclone Bola, John and Valerie continued to grow their enterprise by buying or leasing additional land, all while raising David, their daughter Robyn and youngest son Richard.

By 2004 they had lots of new projects on the go and with Robyn and Richard occupied with other careers, David – already a skilled horticulturist – stepped in, eventually taking over management of what has become a large and energetic orchard operation.



UPDATE: THE SUN SHONE ... UNTIL IT DIDN'T

Just a week after David Ladd picked his block of Satsuma mandarins, the Tairāwhiti region was inundated with heavy rain including – and especially – the big storm of 25 June.

"There's a heap of trees down and a lot of surface water about, but it's draining well and we've got a few days of wind to help dry it out," David says as the storm continued into 26 June. The Burnside Trust orchards had also appeared to have weathered the storm's gale-force winds, he adds. "There are a few mandarins we need to get off the trees and we're confident of doing

that before any rot sets in. And the other varieties, like Navels, we'll treat with things like copper spray to make sure they make it to harvest in great condition."

That same morning, as they dealt with closed roads and evacuated homes, Gisborne District Council reported 24-hour rainfall figures ranging from around 120mm to 220mm at both inland and coastal weather stations.

"We had been thinking about 75mm of rain would have been nice but we certainly didn't need twice that," David says. "So it's not been great, but we are still in a much better position than we were this time last year."

And in the two decades from then that's what he did ... grapevines were pulled, apples went in, new kiwifruit orchards were established, and David took over management of the Burnside operation.

Throughout the years though, citrus has been a mainstay.

"Of the 70 hectares we own or manage around 35 hectares is devoted to citrus, about half in navel oranges and the rest smaller blocks of mandarins, lemons, tangelos, limes, grapefruit and Valencia oranges," says David.

“

We'll continue with established varieties we know will work, while at the same time trying out new products as they become available

"It is those blocks, together with the persimmons, that have come through these last couple of years with the least amount of damage. We definitely had some tree losses and a couple of crappy seasons, but they coped much better than the apples and kiwifruit, so that's been a source of strength for us."

Over the next few months the Burnside team will be full steam ahead harvesting citrus varieties as they come on-stream, as well as replanting young orchards like the Jugala apples that suffered a 40 percent tree loss in the wake of the cyclones.

"We're also keen to get going on a new block of persimmons that had to be put aside as we focused on more urgent things," says David.

“

Most new products have a 20-year cycle of popularity and it's our aim to be at the beginning of that cycle


"So we'll continue with established varieties we know will work, while at the same time trying out new products as they become available so we can stay relevant in the market.

"Most new products have a 20-year cycle of popularity and it's our aim to be at the beginning of that cycle, not at the end."

And despite prevailing headwinds, from high interest rates to a supermarket duopoly, David Ladd plans to keep driving that development.

"There is a lot to be said for working through the seasons, as no two days in this job are ever the same," he says.

"I enjoy being outside and I love the work, so I'm going to stick with it." ●



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Keeping the goodness of New Zealand fruit foremost in the minds of young Kiwis was the drive behind First Fresh taking on its first brand ambassador, rugby star Renee Holmes, who got schooled in the industry by Caroline Holden (Highrise Orchard) before heading to a real school to work with the kids

Resilience and recovery define citrus season

The citrus harvest launched in April with limes and mandarins that indicated a strong season was to come, albeit with lower volumes.

Kristine Walsh

"The quality this year is looking outstanding," says Citrus NZ chair Wayne Hall. "We had a difficult season last year with the wet weather, but this year we've had a hot East Coast summer and Northland has had good growing conditions as well."

With 70 percent of the national citrus crop coming out of the Gisborne/Tairāwhiti region, two years of wet weather punctuated by two powerful cyclones had impacted on fruit quality and quantity.

"But this season is the complete opposite," says Wayne. "The quality of the mandarin and navel orange crops is excellent and it is lining up to be a great-tasting year for these varieties."



Citrus NZ export portfolio lead Ian Albers says an early start to the season saw lemon harvesting begin in April with receptive markets in the primary destinations of Japan and the United States.

For the local market he is optimistic about a strong season for products like Satsuma mandarins and navel oranges for which picking is well underway, to be followed by other varieties throughout and beyond the winter months.

Like Wayne Hall he too, is seeing quality, good-tasting fruit come out of the orchards, but with smaller fruit in smaller volumes than had been experienced in earlier years.

"The yield is certainly up on last year but not back to pre-cyclone levels – which is to be expected," Ian says.

"Trees that sat in wet ground for all that time in 2023 are not going to be fighting-fit, but the dry summer and warmish start to winter has most well on the way to recovery, which bodes well for the future.

"At the same time the growers and organisations that have devoted so much energy to repairing cyclone damage are also in recovery, and they're getting stronger as time goes by."

He hasn't seen too many unplanned exits from the citrus growing industry, so growers have shown real resilience in some pretty tough times, he added.

"But, as always in this field, the weather could impact on that continuing recovery. So we're hoping to see this relatively mild winter continue so the trees can catch a break and growers can get through the harvest then follow up with some pruning to set themselves up for next year."

In terms of operating his own citrus and persimmon-focused marketing business, the Gisborne-based First Fresh, Ian focuses on exploring new markets and working to keep interest high in the existing ones.

That includes educating the next generations of fruit consumers.



CITRUS
NEW ZEALAND

Citrus NZ AGM

The Citrus NZ 30th anniversary Annual General Meeting and conference will be held at Gisborne's Farmers Air Showgrounds Event Centre on **Wednesday, 18 September.**

"That's why we've partnered with our first-ever brand ambassador, Kiwi rugby star Renee Holmes," he says.

"Renee, too, is Gizzy-grown, and she represents health, vitality and all those great things we know are supported by having a good, fruit-filled diet." ●



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Central Otago Young Grower of the Year Luke St John works at the Fortune Fruit packhouse north of Cromwell

Central Otago young grower focuses on education

Growing up in suburbia in Dunedin, Luke St John didn't get much of a chance to grow things, but trips to his grandparents' farm forged his love of horticulture.

Aimee Wilson
Photos by Image Central

This year's Central Otago Young Grower of the Year went on to study a Bachelor of Science in Botany and Ecology, but eventually found his way back to the orchard.

"I actually went to Uni to study chemistry, but I loved plants too much."

His appreciation of seeing pears, apples, blackboy peaches and blueberries growing on the farm in his youth led him to him start working in the Fortune Fruit packhouse north of Cromwell during his summer breaks.

Luke has been running the packhouse operation ever since finishing University, and is currently studying his Level 4 in Horticulture Production, which helped him immensely in the grower competition.

Having just completed his pest and disease unit, Luke flew through the module, but admits the pruning and first aid were challenging.

"Getting the insight from multiple people was good."

His teammate Taylor Priest-Johnson came in close behind him, while second time entrant Devon Attfield of Clyde Orchards picked up third place.

Luke was reluctant to enter the Young Grower Competition, and only did so because his two other workmates were involved and wanted him to be too. But he admits to enjoying all of the tasks, and he loved receiving instant feedback from the judges on how he could do things better.



Central Otago Young Growers, clockwise from front left: Mackenzie Maaka, Fortune Fruit; Devon Attfield, Clyde Orchards; Luke St John, Fortune Fruit; Olly (Oliver) Affleck, Central Orchard Management Ltd; Taylor Priest-Johnson, Fortune Fruit

The pressure of past University exams certainly helped him focus into each of the theoretical tasks. "I had a good understanding of what they need you to write in your answers."

“

I do feel like I'm very invested, and I want to learn as much as I can, as soon as I can

Orchard life has suited Luke very well after growing up in Dunedin, and then after staying on for tertiary years, so he was keen to explore further afield – the lure of skiing in Wānaka was a drawcard too.

Funnily enough, cherries were never his favourite fruit, but after an entire season at Fortune Fruit, Luke certainly changed his tune.

"I used to see them on the Christmas table and think gross, so I didn't eat many the first season, but the second season I ate way too many," he says.

The different experience of export quality fruit straight from the tree, rather than grade two in the supermarkets, was the game changer.

Like many growers, he would love to own his own orchard one day, but in the meantime will keep looking to progress his skills as far as he can go.

"I have learnt a lot on the job, there is still so much to know. I do feel like I'm very invested, and I want to learn as much as I can, as soon as I can."

Luke says he was initially quite shocked at the complexity of growing, and it was an eye opener the amount of work that is involved on a commercial scale. "There is a lot to do to get the crop that you want and need. And getting the big fruit, the maximum yield that is worth the money, is more difficult than what it may seem."

He has been impressed with the support and guidance he has received along the way, "it can be quite daunting and when you first start, you wonder how you will remember all of the things to the level they know."

“

Luke says he was initially quite shocked at the complexity of growing, and it was an eye opener the amount of work that is involved on a commercial scale

"But it's good to be able to fall back on those who have been here longer."

Looking to the future, with all of the automated changes starting to be implemented on orchards, Luke says Fortune Fruit is still run as a traditional orchard. ●



Hawke's Bay Young Grower of the Year, T&G's Grace Fulford, speaking at the competition in June

Hawke's Bay's up-and-coming growers

The winner of this year's Hawke's Bay Young Grower of the Year award is a local girl through and through. T&G's Grace Fulford grew up on Omahuri Orchards, her family's business, so already knew her way around an orchard and packhouse before she decided to pursue it full-time.

Bonnie Flaws

Photos by John Cowpland/alphapix

It only took her one year away at University to realise that the life she wanted lay back home - and the rest is history. Grace joined T&G three years ago, initially on the post-harvest side of things, but later joined the growing team. She works in market quality and compliance.

"I work with all of our orchard managers to try to get the best product we can in the bin, and use my post-harvest background to work in the packhouse to be a grower voice there, advising on how to get the best out of what we pick. There is so much more compliance now.

"It's stuff I've always known because I did a lot of orchard work with the family, it's definitely not new to me. They grow and pack their own fruit at Omahuri Orchards," she says.

Contestants had eight stations to complete on the practical day, as well as a leadership panel and speeches in the two-day competition. They were judged on all three. Grace's winning speech asked: 'Will building a sustainable workforce impact our environment?'

Grace is only the second woman to win the Bay's Young Grower Competition, the other being Bostock's Lisa Arnold in 2018.

"I thought I had a good chance of winning, but you never really know. I'm stoked, absolutely thrilled. It was such a great group of contestants, I think the level of competition was really high. Some of us are a bit more competitive than others. We all gave it a really good shot, but there were a few of us that really wanted to win it."



Left to right: Danielle Sammons, Grace Fulford, Fono Iopu, Jesse Wall, Leander Archer, Maicha Slade, Brooke Hunter, Matthew Wilton

This year's runner-up is also a woman – Leander Archer, assistant technical manager at Sunfruit, who did not come from a horticultural family and instead chose to study horticulture and spent seven years at AgFirst before starting in her current role.

"I am so proud that we had two gals take out the top two spots – the rumour is that that has never happened before," she says.

Leander won the Fruitfed station, a challenge focused on management of the orchard floor.

“

I am so proud that we had two gals take out the top two spots – the rumour is that that has never happened before

"It's something I've looked at quite hard in the past. Like biodiversity, soil preservation and health, how you can control weeds using different methods like 'mow and blow', which adds organic matter over time and increases nutrient and water holding capacity and prevents weeds. I'm a fan," she says.

However, it was her strong performance across the board and confidence in the leadership panel, in which she was runner-up, that saw her take second place.

In third place was Jesse Wall, an assistant orchard manager at Mr Apple. While he has some pedigree – his grandfather

was a grower – he didn't grow up around horticulture, and only discovered his love for it when he got a job with Mr Apple in 2013. Today, he's on his way to becoming an orchard manager.

"I always like the different jobs that change with the season. It's the variations of the jobs with the seasons and the challenges that come with that as well [that make it rewarding]."

Jesse won the Farmlands station and the Tumu station on the practical day. The Farmlands challenge was 'a day in the life of an orchard manager', so he was pretty well placed to succeed on that one. This involved tests around spray preparation and what to use on an organic kiwifruit orchard.

All contestants were positive about the future of the sector after a tough few years, and its ability to continue to attract young people.

"There are educated and really interesting analytical jobs, there are sales jobs with people facing roles, and a wealth of other opportunities. But there is a lot of misconception. People growing up in the Bay might work a summer job picking and think that's all there is to it and actively look elsewhere. But if you can take that person and give them a broader exposure to the kinds of jobs there are, show them a little bit more, these opportunities, these career pathways, then there is definitely room to attract some really good people into the sector."

Jesse says things are looking promising again for the Hawke's Bay a year and half on from Cyclone Gabrielle. "This time last year it was like 'whoa'. We needed to get together and help each other. It looked bleak this time last year, but now it's looking really good," he says.

Grace says while the industry could do better at advocating for itself to young people looking for a career path, there are a lot of good people coming into the industry.

"But we need more," she says.

As for where she is personally heading? She doesn't have a set trajectory yet. "I'm happy learning in the place I am now. It's very vast and I get to do a lot of everything." ●

Runner-up Leander Archer won the Fruitfed station, a challenge looking at management of the orchard floor.



Charitable organisation provides cherry industry with broken bucket fix

Cargill Enterprises, a not-for-profit charitable organisation working with the Disabled Citizens Society, has come up with a solution that returns broken cherry harvest buckets to production.

"I was visiting NZ Cherry Corp general manager, Reece van der Velden at their packhouse in Cromwell, when I saw hundreds of broken buckets," says Cargill Enterprises sales and business development manager, Erik Va'afusuaga.

"I asked Reece about them and got the simple answer, 'they're broken. If you can find a solution, you will be doing me a favour and possibly a lot of others that have this style of bucket'.

"Coming from a production background, the challenge was made and a solution needed to be found. I took this problem back to Cargill Enterprises, knowing full well that our chief executive's interest would spike.

"Together, we set some parameters: keep the solution simple, easy to implement and cost-effective."

Erik says to their surprise, they came up with a solution that met all the criteria.

“

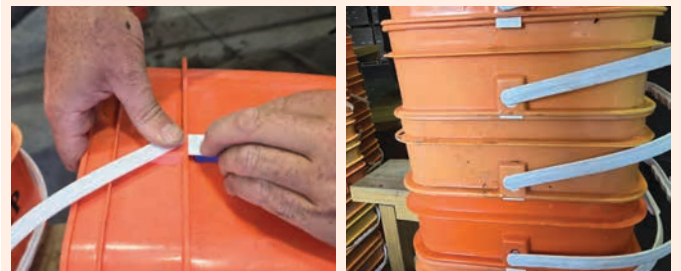
Coming from a production background, the challenge was made and a solution needed to be found

"After some handmade prototype trials, we decided to take our possible solution to NZ Cherry Corp. To our astonishment, they agreed that our solution would work for the majority, if not all the buckets that still had functioning handles."

The extra 'rescue' clip is made to slip inside the bucket insert, where the handle clips in. It clips onto the handle inside the bucket insert, and either substitutes for partly broken or worn inserts or handles. The extra clip will also help strengthen unbroken buckets before these areas start to wear or break.

"Twelve months from our initial meeting with NZ Cherry Corp, we did our first pilot run of Bucket Rescue Clips," says Erik.

"Feedback was positive and has exceeded our expectations. The rescue clips have worked on buckets with handles that were thought to be too broken.



"The repaired buckets will be reintroduced into production for next season. The next thought is to use the rescue clips to reinforce unbroken buckets, as dropped fruit comes at a high price."

Eric says Cargill Enterprises is grateful to NZ Cherry Corp for keeping the broken buckets, having the faith they could be repaired.

"We are proud that we were able to help a long-term customer find a solution for a significant problem." ●

For more information:

Phone: **021 220 9131** or **03 455 5119**

Email: **erik@cargill.kiwi** or **admin@cargill.kiwi**

Website: **www.cargillenterprises.co.nz**

Crop estimation in avocados

A groundbreaking crop estimation technique developed by the Applied Agricultural Remote Sensing Centre (AARSC) at the University of New England (UNE), Australia, is showing remarkable potential for the avocado industry.

Trialled across four orchards during the 2023 - 24 season, this innovative approach could revolutionise how growers predict their yields, enhancing both accuracy and efficiency.

Unlike most crops, avocados do not ripen on the tree. This allows growers some flexibility with harvesting schedules.

Accurate estimation is crucial for setting prices and managing supply. Overestimating can lead to shortages, while underestimating can result in surplus, both of which negatively impact growers' returns and the overall market dynamics.

Professor Andrew Robson, director of the AARSC at UNE, and his team are at the forefront of integrating remote sensing technology for crop estimation. By leveraging freely available satellite imagery, historical yield data, and advanced machine learning techniques, their method has surpassed traditional grower estimates in the initial trials.

One common question is how satellite images can accurately estimate crop loads. Rather than counting individual fruit, satellites capture spectral data from orchard canopies in 10-metre-wide pixels. These reflected light wavelengths correlate with yield data, allowing machine learning predictive models to estimate future crop loads based on canopy reflectance. This technique leverages high temporal resolution satellite data, now spanning multiple years to develop these models, with accuracy continually improving as additional data is incorporated.

The trial covered data from three orchards over six years and one orchard over ten years. The satellite-based models developed by lead AARSC avocado researcher Dr Moshir Rahman provided yield estimates at an orchard level with an impressive accuracy range of 91 to 98 percent, significantly higher than the 67 to 87 percent accuracy of grower estimates. Even with some variations, the satellite approach consistently out-performed traditional methods.



Phillip West :
NZ Avocado
research
manager

Although this innovative method requires clear skies for satellite data collection and accurate historical yield information, it represents a significant advancement. The cost-effectiveness is also notable, offering substantial savings over manual counting methods.

While the technique is not perfect and may not be applicable to all orchards, particularly younger ones with less historical data, it marks an exciting development for the avocado industry. As machine learning models improve with additional data, this approach is expected to become even more accurate, paving the way for better crop management and increased efficiency.

Looking ahead, a larger trial is planned for the 2024 - 25 season, where entire orchards will be treated as single blocks to further validate the satellite-based estimates against grower predictions. The approach has also been successfully trialled in Australia and South Africa. This innovation has the potential to transform crop estimation, making it a valuable tool for the future of agriculture. ●

HOW SATELLITE IMAGES CAN ACCURATELY ESTIMATE CROP LOADS



Satellites capture spectral data



These correlate with yield data



Machine learning estimates future crop loads



An orchard tractor fitted with Dutch company Aurea Imaging's TMS TreeScout sensor, updating fruit counts, size and canopy development maps every time the orchard is mowed or sprayed

Utilising future orchard technologies

Jack Wilson : AgFirst Consultants

Precision horticulture

Precision horticulture, autonomous technology, smart technology, are all buzz words in the industry right now ... and so they should be! We are in a period where the ever-increasing cost of labour creates strain on growers, but also a period where the development of new technology is rapid. This could potentially be our life saver in terms of reducing labour requirement and therefore cost. So, what is precision horticulture and how can it benefit us as growers?

The terms precision horticulture, agtech and smart technology all refer to the use of modern computing technologies to make tasks simpler. This is no longer futuristic talk, a lot of this underlying technology has been around for several years, but may yet have to be optimised in terms of:

- Data processing speed and cost
- Sensor technology cost and capability
- Aligned data output interpretation and usability.

As a matter of fact, the processes of modern technology are quite possibly already being utilised by you on your orchard in some way. The basic process that most of the technology follows includes:



Data is collected
(observations)



Data is analysed
(trends are identified and/or predictions are made)



Decisions are suggested or made
(interpretation)



Action is (or is not) taken
whether manually or automated.

A simple example of this is how we use our local weather stations. The data is collected, then analysed to make predictions. We then interpret these to make informed decisions around practices such as spraying and irrigation.

Think of precision horticulture through a broader lens and the potential for improved outcomes on-orchard or within a business is obvious. For most tasks it means more accurate monitoring, leading to simpler decision making and less guesswork. When using tools such as robotic harvesting or variable rate spraying, it creates opportunity for autonomy. This means tasks that were incredibly laborious in the past become increasingly effective, and therefore are likely to become standard practice over the next five to ten years.

We know there are a range of different precision products on the market, all offering a different set of tools. Most of these technologies likely either provide a reduction in operating costs (applying less chemicals using a variable rate spray application) or an increase in performance – both of which, if successfully implemented, are extremely beneficial to your business.

Where is the need for precision horticulture coming from?

Laborious tasks such as counting, fruit sizing and so on, cost growers a fortune annually. The collection of these metrics gives growers data to make well informed decisions, but if inaccurate, can cause mistakes in block management. Fruit counting and fruit sizing can differ from person to person, and accuracy is all about representativeness. If you are counting a tree in a block that is not representative of the population, then it can be just as dangerous as it is useful.

Many tools using automation or smart technology show advantages over general monitoring tasks due to the representation of the data collected. The technology enables counts to be carried out on single tree in a block in a more cost-effective manner. This drives accuracy and therefore more informed decisions.

Labour has become our Achilles heel in fruit growing as the costs are so high. Growers are screaming out for the next tool that will help to ease their labour demand, whether that be through automation or the use of more accurate data to help drive decisions.

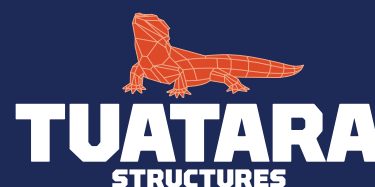


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Will GIS training and a fully CAA approved drone pilot licence become minimum requirements for future orchard managers?



Imaging captured from drones can be analysed in great detail to help make informed decisions on the orchard

Imagine the year 2050


So, what might an orchard look like in 2050? An orchard of the future could look very different from what we are used to today. We are already seeing a transition to the picture I am about to paint so 2050 may well be an over-prediction.

Spring

At this time of the year, jobs on the top of our list include budbreak, chemical thinning, growth regulator applications and the start of hand thinning. Each of these is a task that requires excellent monitoring to inform good execution. But what tools will we have to help us become excellent growers?

1. **Bee movement monitors** – utilising sensors within the orchard that monitor bee movements. These allow you to highlight zones in the orchard that may be under pollinated, prompting you to introduce more bees and alter your pollination requirement for further seasons, or even take a step back from your chemical thinning regime.

2. **Variable rate chemical thinning** – using bloom density mapping to quickly analyse the bloom density variation tree to tree, growers can then plug this map into the variable rate computer to apply targeted chemical thinning the next day.
3. **Variable rate plant growth regulator applications** – after creating your canopy density map you can plug the data into your tractor's computer system to target either growth or growth suppressant spray applications only to the trees that need it. This saves money on chemical costs, while getting the best result for each tree.
4. **Fruit load scanning** – scanning starts from 10mm fruit size (in apples) to measure the effectiveness of the chemical thinning result. Growers can then prioritise hand thinning in missed spots and start to measure fruit size progression on every tree in the orchard.




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Harvest

Harvest is the time where all the hard work throughout the season comes to fruition. It is at harvest when we might see great advancements in the future with the communication of data to the supply chain. Key data points that will be collected may include:

1. **Plant stress sensing** – plants are monitored on a tree level and supplied with the appropriate nutrient and water requirements through variable rate fertigation and irrigation systems.
2. **Tractor mounted camera systems** – data is gold, and every time we drive through the orchard we are given an opportunity to collect data. In 2050 growers will be updating fruit counts, size and canopy development maps every time the orchard is mowed or sprayed.
3. **Artificial Intelligence (AI)** will be utilised to help streamline the crop forecasting from the orchard all the way up the supply chain.
4. To harvest a proportion of the orchard, **robotic harvesters** (whether drones or land-based machines) will work night and day, helping to relieve labour demands.
5. **Labour efficiency** metric collection will be automated, every harvested bin will be tracked, creating an accurate yield map output. During harvest, platforms will be equipped with colour graders, giving quality controllers live feedback of whether pickers are picking to standard or not.
6. **Bin carriers** – full bins will be picked up with small autonomous platforms then transferred to the loading bay, reducing the need for tractor drivers during harvest.

Throughout the growing season

Within the smart technology space, there are tools that can influence performance throughout the season. The implementation of this technology is often focused on labour efficiencies, product optimisation and general system efficiencies.



Autonomous vehicles – throughout the season tractors equipped with GPS (global positioning systems) will be used to mow and spray orchards, freeing up labour needed for other tasks. Similar repetitive tasks are also great candidates for automation.



Data software compatibility – our chosen data software will be able to connect easily with other software, limiting and potentially eliminating the need for data entry at multiple touchpoints. Production results will be transferred straight from the packhouse into our management systems without any manual input.



Weather – we will have refined climate trends and their influence on fruit production at a microclimate level. Growers will be informed of anything unusual, such as the low GDD (growing degree days) seen during the cell division period in the 2024 season.

Kiwifruit
New Zealand



NOTICE OF ELECTION & NOMINATION OF CANDIDATES

Kiwifruit New Zealand is established under the Kiwifruit Export Regulations 1999 for the purpose of authorising Zespri to export New Zealand grown kiwifruit, to determine collaborative marketing applications, and to monitor and enforce measures that mitigate the potential costs and risks of a single desk exporter.

The Kiwifruit New Zealand Board consists of six members of which three members are elected by producers for a three-year term. Due to one member's term expiring on 30th September 2024, KNZ will be conducting an election in the coming months to fill that position.

VOTING ELIGIBILITY:

Producers who are eligible to vote in the election are:

1. the owners of land in New Zealand on which kiwifruit is produced for export sale; or
2. such other persons determined by the Board to be producers of such kiwifruit

All producers will be receiving a Notice of Election which will be posted early July 2024. If you believe you are eligible to vote in the election, and do not receive a Notice of Election, please contact Kiwifruit New Zealand (details below). To be eligible to vote, producers are required to provide sufficient evidence that they qualify as a producer. Based on the information provided, the Board will determine the eligibility to vote.

NOMINATIONS:

Nominations are invited for the election of one Director to the Board of Kiwifruit New Zealand. The election will be held in September 2024.

To request a candidate nomination form, please contact KNZ at the details below. If more than one nomination is received a vote will be held. The voting papers will be sent by email or post to all producers.

The candidate receiving the most votes will take office for a three-year term effective from 1 October 2024.

TIMETABLE

Nominations open	22 July 2024
Nominations close	5 August 2024
Voting papers sent to producers	23 August 2024
Voting opens	23 August 2024
Voting closes	9 September 2024
Results announced	11 September 2024
Newly elected Director to take office	1 October 2024

Contact:

Amy Te Whetu
PO Box 4683 Mount Maunganui South, 3149
Phone: (07) 572 3685 Email: admin@knz.co.nz

All this smart technology and precision equipment is on the market right now. It is up to us and the developers to work out how it will best fit each type of business so we can start to see incremental gain in this space.

To me these technologies sound exciting and a progression in the right direction. I am also very aware with all this change in strategy as well as tools, we are going to see a shift in skillset required from our workforce.

In 2050 a job advert might read:

ORCHARDIST WANTED

Looking for an experienced orchardist to join a vibrant and data driven business as an assistant manager. Applicant must have:

- Full driver's licence
- Minimum 3 years' orcharding experience
- Fully CAA approved (drone pilot licence) GIS training
- 5 years' software experience
- Data analysis and interpretation skills

Not an easy find right now, but the more we are testing this space the more we can train our people.

Preparing for technology uptake

The 'present orchard' is a spread of development and transition in terms of the adoption of research relating to canopy systems, irrigation, data management and so on. Some orchards are considerably more advanced than others, but there is plenty of 'old' and 'new' across many orchards. This will continue to be the case, as the transition to new ideas does not happen overnight, but the time taken within the redevelopment cycle is likely to reduce.

We need to be prepared for this change. We already know that some technology such as scanning is not applicable to older canopy systems. Minimising limitations needs to be front of mind when thinking out your development strategies. So, what do we need?

- **Canopy system** - you would've heard time and time again that a canopy system suited to robotics and automation is one that is simple with no complexity. Narrow canopies where you can see and reach 90 to 95 percent of the fruit are highly desirable for new technologies.
- **Compatibility of new equipment** - when developing your orchard or orchard equipment think about what is compatible to the top products offering these smart technologies. E.g. Could your irrigation system be adapted to variable rate application?
- **Data** - the growers that are going to easily transition to the 2050 orchard are those that collect good orchard metrics and make the majority of their decisions around good, informed data. A grower's ability to use and interpret additional information collected becomes easier when they are already growing with this frame of mind.
- **Acknowledging the needs of your business** - whilst there are hundreds of new pieces of technology offering clear benefits, it is important to identify the issues you need to address on your own orchard, identify possible technology solutions and any barriers to adoption. Start by considering new technologies today but remember there is nothing wrong with looking around and making sure the technology you adopt is serving a good purpose for your business. Starting today will help you to have a better understanding of the technology space and what might come from it for you and your business in the future.

Conclusion

The 2050 orchard might be closer than we think. Smart technology and precision horticulture is here now and being utilised with great success. However, we are not yet able to take advantage of all the systems in a cost-effective way that is suited to each orchard business. The technology is there, so maybe our 2050 vision might be the ability for systems to talk to each other, thus interlinking and utilising the gains of each. Understanding your business needs and how the new technology might solve your issues is crucial, as is having an open mind to the possibilities. ●

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- The "spray on" that adds to all other methods
- Good results have been achieved when applied through irrigation lines

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High accuracy GPS to boost tech adoption

Do you use GPS devices on your farm or orchard? A new government satellite service brings New Zealand up to speed.

The Orchardist staff

SouthPAN (Southern Positioning Augmentation Network) improves the accuracy of GPS (global positioning systems) from five to ten metres down to less than a metre, and in some cases as little as 10 centimetres. It is available now and free to use.

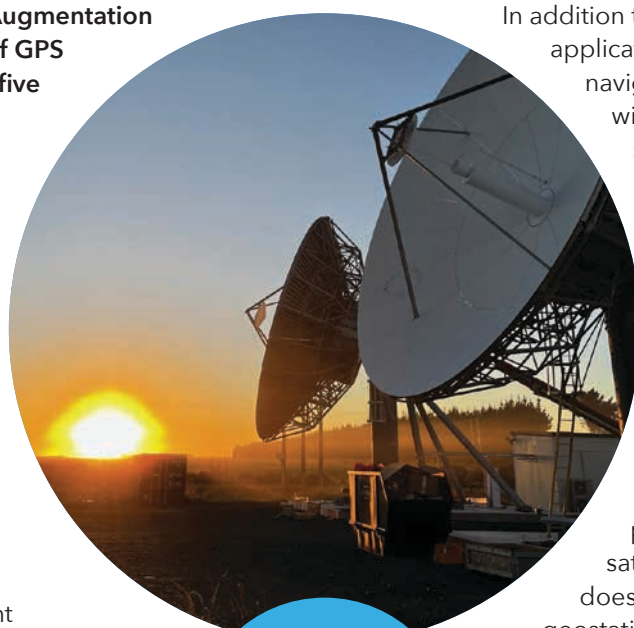
Drones, autonomous sprayers, transport, mapping or geospatial and many other tools can all access SouthPAN as long as they have a compatible GPS receiver and antenna, says Michael Appleyard, director – customer delivery at Toitū Te Whenua Land Information New Zealand (LINZ).

“Although high-end GPS equipment capable of centimetre-level precision is already available to the industry,” he says, “SouthPAN bridges a gap in capability for growers where very high accuracy is cost-prohibitive, but repeatability and reliability are a priority.”

The service has the potential to increase adoption of precision horticulture tools, which in turn can help horticulture become more productive and reduce labour costs. For tech innovators, the service offers new opportunities to develop and trial improved products and services.

Agriculture consultants Page Bloomer are current users of SouthPAN. Principal Dan Bloomer says they are benefiting from improved efficiency and processes that have helped to avoid costs associated with repeating expensive work.

SouthPAN is the first Satellite Based Augmentation System (SBAS) in the Southern Hemisphere and is a joint initiative between the New Zealand and Australian governments. The technology brings New Zealand and Australia up to speed with other leading countries when it comes to critical positioning infrastructure.



Satellite dishes at the Awarua uplink and ground control centre. Photo supplied by LINZ

In addition to its primary sector applications, the precise positioning, navigation and timing capability will impact multiple sectors such as aviation, transport, maritime, construction and infrastructure. LINZ and Geoscience Australia are responsible for the delivery of the project on behalf of our respective countries.

Cellular and internet connection has no impact on the use of SouthPAN. The services are primarily provided via geostationary satellite. However, if their receiver doesn't have a clear view of the geostationary satellite, users do have the option of accessing SouthPAN services via the internet as well.

Visit the LINZ website for a list of compatible receivers, along with steps on how to configure a selection of receivers to access and use SouthPAN. This list and configuration resource will be developed over time. ●



For more information, email southpan@linz.govt.nz or visit: www.linz.govt.nz/southpan.

You can also meet the SouthPAN team at the Horticulture Conference, 28-30 August. www.hortnzevents.co.nz

Reporting capability is significant for growers' business improvement

Growers are getting far more than just meeting legislated compliance requirements with ABC Software's ABCgrower.

Efficiency is improved by removing double-handling and reducing errors. The greatest return however, comes from the reporting functions in ABCgrower with worker productivity and costs immediately visible.

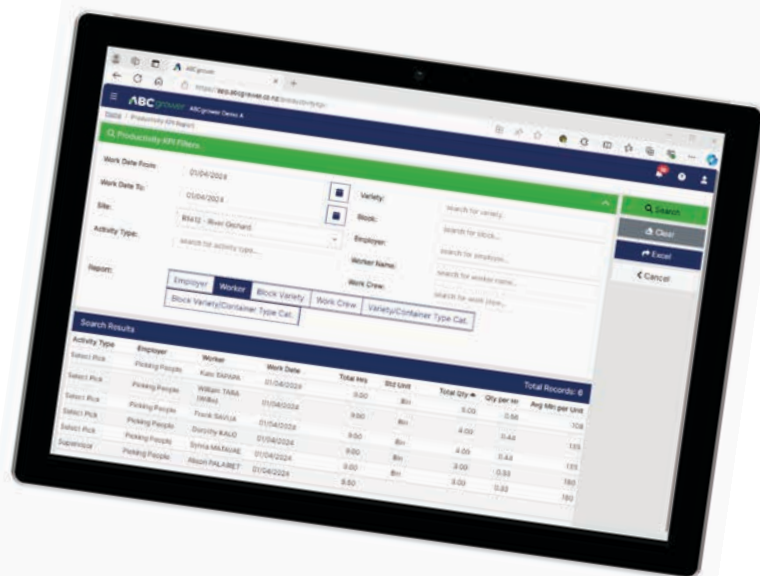
ABCgrower is a Cloud-based on-orchard labour and inventory management tool that includes an off-line app for in-field digital record keeping. Growers record information, such as workers' times and tasks, which the software presents back to them in various ways. By using this information to make informed decisions, growers have reported substantial reductions in labour costs.

“

If you can't measure it, you can't improve it

With ABCgrower App supervisors have real-time visibility of their team's productivity, including dollars earned per hour for piece rate tasks. They can look into why workers might be under-performing and better manage their crews. "One of the key benefits we've gained from using ABCgrower is driving productivity by showing our workers what they've achieved in a day – it really incentivises them!... We see the results directly affecting our bottom line." says Widem Farming managing director Wim van Niekerk.

The comprehensive Productivity Report on ABCgrower Web shows worker productivity across the orchard. The information is presented in several ways, including productivity by block. Smart Berries Australia farm manager Sally Jolly says "It's made us far more efficient in what we do. We can filter out information every possible way now."



ABCgrower's Block Cost Report shows labour costs by block variety, or alternatively by variety. Growers can see costs by tree, by hectare and by harvested kilogram. By tracking labour costs to specific areas of their operation, it gives growers insights to identify inefficiencies and optimise resource allocation. Berry Farms NZ general manager Johnny Milmine says "using ABCgrower for us has benefitted the business in the sense that we can see where our costs are".

When packaged with ABCspray, chemical costs are also shown in the Block Cost Report. ABCspray is a comprehensive electronic agrichemical diary that comes complete with a consumables inventory management solution.

The business adage "if you can't measure it, you can't improve it" holds true in horticulture. Rather than considering orchard record keeping a regulatory necessity, smart growers see it as a strategic benefit. From managing crews to understanding and controlling costs, good software tools allow growers to make data-driven decisions to drive profitability. "ABC Software's product suite provides the tools for you to cultivate success in your business, via cost control, labour efficiency, and traceability," concludes ABC Software founder and managing director Sharon Chapman. ●



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Hawke's Bay

Partnering in the future of horticulture

As automation becomes part of the everyday in New Zealand horticulture, and with pipfruit in particular, providing the next generation with the skills and confidence to thrive in a changing world is key.

At Genesis Nurseries, we're thrilled to announce our exciting partnership with New Zealand's Eastern Institute of Technology (EIT) in Hawke's Bay, aimed at bridging the gap between classroom learning and commercial automation experience.

Joining forces on the vision, Genesis Nurseries and Goldpine are combining their resources to establish a working orchard with four 17-metre-long rows of pipfruit. These rows will feature various training structures, including a two-leader dwarf row, a row of FOPS (Future Orchard Planting Systems), a 2D (two-dimensional) row and a V-Trellis row, with 20 posts and an average of seven wires per row.

"Most orchard experience is gained in the workplace. But this mini orchard will provide an environment to relate course content visually to students and offer a space to trial ideas," Steven Hartley EIT's fruit production tutor explains.

However, the development of the mini orchard grew from a concept much deeper than hands-on-learning. As the horticultural industry continues to introduce fruit wall training structures and ramp up the use of platforms, improving harvest efficiency and eliminating the use of ladders, EIT saw the need to expose their students to automation.

"We could have created an obstacle course for platform driving training, but conversations with platform suppliers and users highlighted the need to train students on actual functionalities. This way, they learn in a realistic environment," says Steven.

The initiative's potential is already evident. Students will not only learn to drive platforms, but could now potentially gain experience with a Darwin String Thinner, an automated spinner for thinning flowers. They will compare tractor trimming with traditional pruning, assessing the balance between cost, quality and the benefits of automation. Additionally, they will explore the commercial impact of high-quality fruit varieties, an area where Genesis plays a crucial role.

Learning to work with wood and understanding its environmental benefits will be valuable as sustainability and reducing emissions come into sharper focus

Students will also be actively involved in constructing the orchard, from digging and installing posts to straining the wire supplied by Goldpine. "It's been awesome to see this initiative come to life, as we too see the value in hands-on experience, especially the use of wood posts, a natural, sustainable and low-carbon material perfect for orchard infrastructure," says Aaron Mullins, sustainability manager at Goldpine.

Wood has always been the preferred material for orchard infrastructure. For students, learning to work with wood and understanding its environmental benefits will be valuable as sustainability and reducing emissions come into sharper focus.

Genesis Nurseries is not only supporting the next generation of horticulturists but also staying at the forefront of industry innovation. "By supplying our high-quality trees, we get to see first-hand how these trees perform with new growing techniques, and we can share this real-life data with our customers and with growers," says Dean Smith, business development and intellectual property manager of Genesis Nurseries.

Internally, Genesis is committed to building a high-performing team equipped with the knowledge and skills. "Just like our current nursery manager who has worked his way up the ranks over 12 years, we hope that the up-and-coming horticulturalists benefitting from this EIT initiative may one day bring their skillset to our team", says Hayden Green, chief executive of Genesis Nurseries.

When the trees arrive, students will also help to get them in the ground, gaining hands-on experience every step of the way. This involvement ensures that students can apply their classroom knowledge to real-world scenarios, fostering a deeper understanding and appreciation of the industry.

With this partnership, Genesis Nurseries and EIT are not just growing trees, they are cultivating the next generation of world-leading growers. ●



YOUR INDUSTRY

ACROSS THE SECTOR — ACROSS THE COUNTRY

Humans and
tech: the
perfect combo

Page 33



Leveraging AI to enhance weather forecasting



Mohammed Nabi : MetService consultant meteorologist

Weather forecasting in New Zealand is a complex and challenging task, owing to the country's unique and varied geography. From the rugged Southern Alps to the expansive plains of Canterbury and the intricate coastline that stretches for thousands of kilometres, New Zealand's topography plays a significant role in the local climate.

This geographical diversity, while lending to the beauty of the landscape, also establishes microclimates that can vary dramatically over short distances, making accurate weather prediction a demanding endeavour.

Aotearoa's location in the mid-latitudes further complicates weather prediction. The country is frequently influenced by a mix of tropical and polar air masses, which interact to create rapidly changing and often unpredictable weather conditions. The surrounding ocean further significantly impacts weather patterns, with maritime influences bringing another layer of complexity into weather prediction.

Furthermore, the effects of climate change are becoming increasingly evident. With rising global temperatures, the country experiences heightened variability in weather patterns, including more intense storms, unpredictable rainfall and extreme temperature fluctuations. This rapidly changing climate adds yet another layer of difficulty to the already challenging task of weather forecasting.

Numerical weather prediction (NWP) models, which are primarily physics-based, have been the cornerstone of weather forecasting for the better part of the last century. These models use mathematical equations to simulate the atmosphere's behaviour, considering factors like temperature, humidity, wind and pressure. While these models have been immensely valuable, their resolution is often insufficient to capture the fine-scale variations in the weather that are critical for growers in New Zealand. Developing higher resolution models to capture localised weather patterns is cost-prohibitive and requires enormous computing resources.

Machine learning in weather forecasting

At MetService, we are committed to overcoming these challenges and providing more accurate and localised weather forecasts. One of the most promising recent advancements in this field is the integration of artificial intelligence (AI), specifically machine learning, into our forecasting processes.

“

We are pioneering the use of physics-informed machine learning models

Machine learning, a subset of AI, involves training algorithms on large datasets to recognise patterns and make predictions. When applied to weather forecasting, machine learning algorithms can analyse vast amounts of meteorological data from various sources, including satellites, weather stations and historical records. This data-driven approach allows us to identify trends and correlations that might not be evident through traditional methods.

However, to bridge the gap between current NWP models and observations, we are pioneering the use of physics-informed machine learning models. These models combine the strengths of traditional physics-based approaches with the adaptability and pattern-recognition capabilities of machine learning, to generate precise localised forecasts.

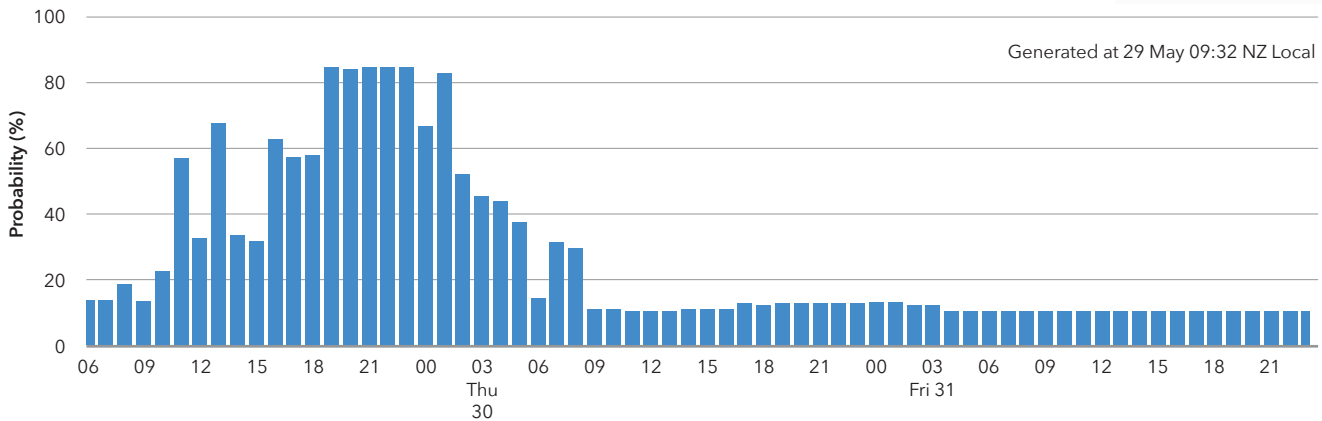


Machine learning wind gust models

Auckland Harbour Bridge 8km Model Average Gust Prob >90km/h

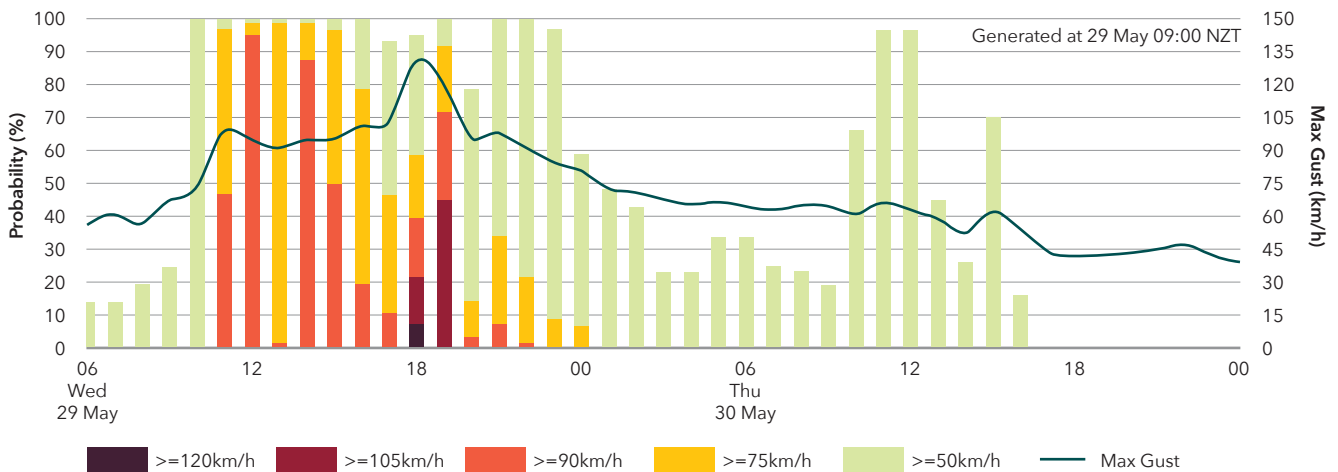


Generated at 29 May 09:32 NZ Local



Auckland Harbour (vicinity AHB) 1.5km WRF EC Gust Probability

Generated at 29 May 09:00 NZT



A real-world example of machine learning wind gust models (image on the top) for Auckland Harbour Bridge during the recent wind event. The image below is a forecast of the same event from our high resolution 1.5km model. Both models are forecasting a period of very strong and gusty winds on the evening of 29 May. Notice that the machine learning model is performing equally as capably as our highest resolution model for this phenomenon, although it is trained on data from a much lower resolution model (8km). There was an initial burst of strong winds around the middle of the day which both models pick out, then a prolonged period of strong winds from about 6pm to 10pm

How physics-informed machine learning works

Physics-informed machine learning models are designed to **respect the fundamental laws of physics while leveraging the predictive power of AI**. They enhance the resolution and accuracy of weather forecasts by fine-tuning the output of NWP models, correcting for biases, and improving predictions in complex terrains and microclimates.

For example, in the Hawke's Bay, where orchards are sensitive to sudden frost events, these advanced models can offer more reliable frost warnings by integrating data from various microclimates within the region. This level of precision helps growers take proactive measures to protect their crops.

“

Machine learning algorithms can analyse vast amounts of meteorological data from various sources, including satellites, weather stations and historical records



Image generated by AI (ChatGPT 4o) with key prompt words:
New Zealand, Growers, Weather, AI models

Similarly, in a region like the Waikato, known for its foggy mornings and clear afternoons, traditional models might struggle to accurately predict the onset and dissipation of fog. A physics-informed machine learning model can analyse historical fog patterns and the corresponding NWP forecasts, then build an appropriate relationship between these features to provide a more accurate forecast, benefiting dairy farmers who need to plan their milking schedules.

This technique of using the output of NWP models to train machine learning models on observations is particularly helpful when forecasting extreme weather conditions. Our team of consultant meteorologists pioneered this method for forecasting extreme wind gusts at Auckland Harbour Bridge and Remutaka Hill Summit in late 2021. We now use physics-informed machine learning models in combination with NWP models and observation data to monitor and forecast the timing of extreme wind gusts at these locations. Physics-informed machine learning models have enabled us to forecast the time of occurrence and likelihood of these extreme events with a higher degree of accuracy.

Human (forecaster) experience in the interpretation of the model outputs is the final piece of the puzzle, enabling the most informed decision using this technology.

Benefits for New Zealand growers

The integration of AI into weather forecasting holds immense potential for the horticultural sector in New Zealand. Accurate and localised weather predictions enable growers to make



Callum Ross, Hawke's Bay Fruitgrowers' Association chief executive and chairman of HAG (Horticulture Advisory Group), provided this image. HAG leveraged the data from its portal to generate an AI data driven image that visually represents the impact Cyclone Gabrielle had on growers.

better-informed decisions, optimising planting, irrigation and harvesting schedules. By anticipating adverse extreme weather conditions, growers can take timely actions to mitigate risks, reducing potential losses and improving crop yield and quality.

Precise predictions of rainfall, temperature and wind conditions allow for better planning of water usage, pest control and fertilisation, ultimately leading to more sustainable growing practices through more efficient resource management.

We are excited about the future of weather forecasting at MetService, and the role that AI will play in transforming this field. By continually refining our models and incorporating the latest technological advancements, we aim to provide growers with the most accurate and actionable weather information possible.

Our goal is to ensure that growers and orchardists have the tools they need to navigate the challenges of New Zealand's unique climate, maximising productivity and sustainability in the face of an ever-changing environment. ●



As always, you should keep up to date with the MetService long-range forecast at <http://metservice.com/rural/monthly-outlook>, or ask us questions on the MetService Facebook or Twitter feeds.

New Cloud-based software solution helps businesses deliver on quality

The team at ABC Software understand how critical quality assurance and quality control is and have recently released a new application to help businesses manage their QA/QC requirements.

A quality module has always been offered with their existing solutions for growers and packers, however their new application, ABCquality, is a Cloud-based product dedicated entirely to quality.

ABC Software founder and managing director Sharon Chapman describes it as “an intuitive application that streamlines quality assessments”.

“Using ABCquality in a fruit packing facility, for example, allows the business to assess and record what they are receiving from the grower at one end, to ensuring they are meeting the specifications of the buyer at the other. Furthermore, any issues can be identified in process, where timely remedial action can be taken, which is significantly more cost-effective than down the track” says Sharon.

“

The solution allows easy recording of observations, defects and measurements

ABCquality is a SaaS (software as a service) product, which means client data is stored securely in the Cloud, and the application can be used where and when it is required, on any device. ABC Software also offers ABCquality as an on-premise installation if internet connectivity is poor.

The solution allows easy recording of observations, defects and measurements. Summary statistics and pass/fail status are auto-calculated according to user-defined tolerances. The system supports signature and photo capture.



Selecting oranges for quality assessment at Tumut Grove Citrus

Photos can be taken to support assessments, as well as the use of reference photos for systematic application of business rules and consistency between users.

“

An intuitive application that streamlines quality assessments

“It’s entirely flexible and user-defined” says Sharon, meaning organisations set up the system to suit their business type and processes. She explains “the goal is to fit with our clients’ businesses and minimise the changes they have to make”. ABCquality is currently being trialed by Fresh Produce Group, one of Australia’s largest produce suppliers.

ABC Software’s core business serves the horticulture industry, and while ABCquality was born out of the packing shed, it is applicable to any business with QA/QC requirements. As well as integrating with ABC Software’s complete packhouse solution ABCpacker, the system can accept inputs from any other software. This may be a packhouse application, an ERP (Enterprise Resource Planning) system, a manufacturing system, or anything else, and as Sharon says “this capability, along with its flexibility, means that ABCquality is applicable to any industry, the sky’s the limit! ●



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Growing data

Customers, supply chains, industry bodies and national and regional regulators all want more grower data. There are good reasons for it.

Elaine Fisher

High quality data can increase value and consumer confidence, and it can benefit the sector in many other ways. However, supplying multiple layers of increasingly complex information is becoming a major frustration for growers. What can be done to minimise the administrative burden?

Collective data sharing helps the industry to improve performance. For example, data and industry mapping is essential for the work of NZ Apples and Pears in enabling its members to prosper.

"It gives us the ability to optimise value and orchard gate returns and provides insights for growers as they make commercial decisions," says NZ Apples and Pears chief executive Karen Morrish.

Damien Farrelly, NZGAP (New Zealand Good Agricultural Practice) manager at Horticulture New Zealand says there is also a collective benefit for growers where industry bodies can use farm data and maps to advocate for a policy position such as an improved allocation of resources for horticulture.

"Aggregated and analysed sector information can provide evidence in support of the sector's policy position to advocate for improved water allocation, for example, while demonstrating sustainable use, and minimal impact on the environment. This can give confidence to regulators when making policy decisions which impact on horticulture," says Damien.

Geographic data – maps in other words – are also becoming richer and more useful. Maps are a fundamental starting point for a farm plan.

"A picture tells a thousand words, and maps are a picture of the farm," Damien continues. "They support growers to meet GAP requirements through developing their risk assessment for food safety, environment, health and safety, and social practice."

Biosecurity and severe weather events

The benefit of quality data to apple orchardists was clearly demonstrated during the response to Cyclone Gabrielle in February 2023.

"It allowed us to advocate for our members and our industry as a whole, and to very quickly liaise with MPI (the Ministry for Primary Industries) and government officials," says Karen.

Within days of the cyclone, NZ Apples and Pears had received information on the impacted areas, which was overlayed onto a GIS (Geographic Information Systems) map for Hawke's Bay.

"We mapped stopbank breaches and developed a clear picture of what infrastructure had been destroyed. We were able to identify affected growers and provide resources and information to where it was needed most.

"Growers confirmed the impact to blocks and this was used to inform government and other authorities on the location and extent of damage.

“

The benefit of quality data was clearly demonstrated during the response to Cyclone Gabrielle in February 2023

"It also allowed us to re-estimate our crop forecast as we knew which orchards and varieties were impacted," says Karen.

Data collection also increases efficiency during biosecurity responses. In a hypothetical example, Karen says the current dataset would allow NZ Apples and Pears to ensure export restriction zones were implemented immediately, and work with MPI to achieve better outcomes.



"There needs to be serious consideration given to the cost-benefit of collecting and maintaining this dataset at each level."

Damien Farrelly,
NZGAP manager

"Pre-sourced data would allow us to negotiate restriction zone borders, potentially navigating the exclusion of borderline blocks or packhouses, and map around major transport routes," she says.

Data collecting

NZ Apples and Pears has a significant pool of data but has a way to go before it can be utilised to its full potential – which is a focus area for the organisation.

Industry have been providing us with data for many years and thanks to this we have tools such as maps for industry to use. Now we are looking at how we can optimise the sharing of data to avoid duplication.

The pool of collective grower data held by all product groups, exporters, industry assurance schemes and government includes information on geography, crop type, crop protection, environment and yields.

Supplying all that data to various bodies is frustrating for growers who are forced to manually re-enter data, or reformat or recalculate data for different reports or parties.

All the various government and industry databases hold duplicated data with inconsistent formats, maintained with varying degrees of accuracy.



The 'Grower Hub' currently under development is a single shared portal for growers to manage their data and interactions efficiently and seamlessly across multiple product groups

Regulators and industry bodies need to focus on what really needs to be collected and shared, and how this is achieved, as Damien explains.

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WHAT SORT OF DATA IS HELD?

The pool of collective grower data held by all product groups, exporters, industry assurance schemes and government includes information on:



Geography



Crop type



Crop protection



Yields



Environment

"There needs to be serious consideration given to the cost-benefit of collecting and maintaining this dataset at each level. The detail required for farm-level data is different from what is needed for macro level reporting or decision making at a national level. There are also considerable data governance, data sharing and data security issues which need to be navigated."

Collaboration is key

One answer for horticulture may be the 'Grower Hub' currently under development by Horticulture Executive Services Ltd (HESL) and funded by the Ministry for Primary Industries.

James Kuperus, chief executive of HESL (in addition to his role as chief executive of Onions NZ) says Grower Hub will be a single shared portal for growers to manage their data and interactions efficiently and seamlessly across multiple product groups.

“

There are also considerable data governance, data sharing and data security issues which need to be navigated

"This will enable growers to access multiple product groups to quickly view, add or upload levy data. GIS maps can be created, imported and exported so growers have geospatial records to aid in any disaster, emergency or biosecurity event.

"For exporters, export registrations can be done online reusing your data. Ultimately, the Grower Hub portal will save growers time and costs, and improve levy and record management efficiencies and data accuracy," says James.

However, the success of any portal requires greater industry-wide data standardisation, says Grant Rae, director of management solutions specialists iuxta Advisory which is supporting HESL to develop the Grower Hub.

“

The emphasis needs to move from collection to analysis and insights

"Improving data consistency and commonality ensures everyone is talking the same language and ultimately reduces the administration burden and inefficiencies. There are primary production sectors where this is already happening, as well as other sectors in the economy where this is more advanced."

Grower led approach

The fundamental questions remain: who needs what grower data and why? Damien says that the emphasis needs to move from collection to analysis and insights.

"While there are some ongoing efforts to collaborate, much of the 'data-hoovering' requirements which creep in via policy and implementation need to be minimised first. A more outcomes focused approach would help to minimise administration and optimise the data and systems requirements across the sector."

There are plenty of on-farm precision horticulture tools on the market to help growers better manage their own operations. These tools can play a major role in helping manage compliance data, but care is needed when considering which ones to start working with. Growers are advised to undertake due diligence when considering new technologies and to be wary of any overpromising in this space, Damien says.

"Rather than facilitating the 'data grab', on-farm tools can provide the insights that show that systems are operating as expected and that outcomes are being achieved", he says. "We see this as a major supporting component of the future of assurance where an auditor will be reviewing dashboards, trends, issues and systems to supplement spot checking of individual records during audit.

"When outcomes are not achieved, growers will have the information and insights they need to take the corrective action required. This supports the grower led approach to continuous improvement which is becoming an increasingly important part of GAP in the new versions of NZGAP and GLOBALG.A.P. standards being rolled out this year." ●



People and technology working together is more likely than robots taking over harvesting completely

Orchards designed for robot/human future

New Zealand orchardists are increasingly shifting to 2-D (two-dimensional) structures to increase fruit tree yield and productivity – and in the process creating robot-ready orchards. However, that reality could be decades away.

Elaine Fisher

Photographs : courtesy of Plant & Food Research

“Even if it was possible to build robots for all orchard tasks, ethical consumers may not want to buy food produced by machines if it created significant human unemployment. The most likely future will be one in which humans and machines work together,” says Plant & Food Research senior scientist and orchard innovator Dr Ben van Hooijdonk.

“Robots are unlikely to be able to do everything on orchards. We will always need people, including to operate and service robots,” says Dr Jill Stanley, science group leader – fruit crops physiology, Plant & Food Research.

Growers and scientists aren’t waiting for the robots to arrive. New orchards, planted with trees with a productive life of more than 20 years, are being future-proofed as

much as possible, using narrower row spacing and new training systems to increase productivity and accommodate robots.

Both Ben and Jill are involved in Plant & Food Research’s Future Orchard Planting Systems (FOPS), a scientifically proven fruit tree growing system with the potential to double yields and improve fruit quality by bringing orchard rows closer together and growing trees in a planar (two-dimensional) structure. This maximises the trees’ use of available sunlight.

Jill says the planar system is ideal for robots. “For harvesting, pruning or thinning, the planar canopy makes it easier for the robot to ‘see’ every fruit, branch and leaf than it would be in a three-dimensional canopy.



Two dimensional fruit growing systems are good for yield, but also make it easier for robots to 'see' every fruit, branch and leaf

"The fact that we don't have robots yet isn't a reason to stop designing orchards suitable for them. We need to push forward with orchard design to help encourage companies to develop the robots the industry needs."

Ben would love to see more robots in orchards right now, but acknowledges it could be up to two decades before some types of robots become commercially available and financially viable.

"Robotic development has not advanced in the last ten years as quickly as I hoped it would because the engineering is difficult and complex."

While some autonomous machines for weeding and spraying are already available, those capable of the more complex task of harvesting fruit are some way off.

"It could be 15 to 20 years away because of the complexity of picking fruit quickly without damaging it and doing it better than humans can. The human brain controlling a pair of worker's hands can make complex decisions to pick up to four apples at once with great speed and precision."

New orchard designs are resulting in significant increases in fruit yield, which could mean a 20 to 30 ha orchard may require multiple robots to select pick all the fruit within a two-week period.

"Presently the business case to design and develop some types of robots is challenging because it is very expensive, the engineering challenges are immense and there is no guarantee of market success, which represents considerable risk for robotic developers" Ben explains.

“

We need to push forward with orchard design to help encourage companies to develop the robots the industry needs



"Hence, it would be great to see future government investment in a suite of programmes to give impetus to get horticultural robotic development going. Once it was up and running, aspects could be privatised, but it needs an initial investment push."

To be financially viable for growers, robots will need to be multi-use. "It's not practical or economical to have a \$10m robot that only does one task per year. An ideal robot would be fully autonomous and include a self-driving chassis with multiple modules that can be removed or attached to complete different tasks such as pruning, spraying and picking."

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Jill says larger horticultural organisations might be able to introduce robots faster, but it will be harder for smaller operators to justify the spend. "They may have one or two harvesters to help speed up picking but will still need people."

“

Wearable technology is an innovation which might arrive more quickly than autonomous machines

One big advantage robotic harvesters could bring is the use of infrared and other sensing, to identify fruit dry matter and colour, assisting decisions on which fruit are ready to pick. "This can be more difficult for humans who only use the colour of the fruit to make decisions. Using robots could result in more fruit being picked at the right maturity."

Wearable technology is an innovation which might arrive more quickly than autonomous machines. Pickers could wear glasses with inbuilt technology running algorithms to identify the quality of fruit to harvest or which cut to make when pruning.

"It could be quite neat to see how humans work with machines in future. Machines might work at night when humans don't, and machines could pick the top half of the tree while humans harvest from the ground," says Ben.

The 2-D canopy system is also easier for humans to work in, and Jill says as an intermediate phase towards robots, orchards are already using mobile platforms for workers to operate from, speeding up orchard tasks such as picking and pruning.

“

Robots are yet to compete with human hands

Dr Ben van Hooijdonk,
Plant & Food Research
senior scientist and
orchard innovator



Ideally the robots of the future will be able to predict yields, prune based on bud counts, carry out flower thinning, pollination, crop estimation by counting fruit and tracking fruit growth, assess fruit dry matter, manage the canopy, detect and spray pests and weed orchards, much of that alongside humans.

But it's not just tree and vine training and row spacing that need to be taken into account in orchard designs. Charging stations for robots will also likely be needed.

"Some people are looking at installing photovoltaic nets above the canopy collecting some of the light at the hottest time of the day. This is when you don't necessarily want to have light on the canopy as when it's hot that can have a negative effect on the leaves and fruit. Instead, the nets would capture light and convert it into energy used to charge robots," says Jill. ●

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A New Zealand agritech cohort visiting Peregrine wines in Central Otago

We love tech – but are we tech leaders?

? How closely do growers and technology innovators work together?

Our successes are inextricably linked. New Zealand growers have a reputation for being innovative – another way of saying they embrace (and help create) great technology. New Zealand innovators have the reputation of being pragmatic and very attuned to grower needs. It's a virtuous cycle that has abundant growth potential. Of course, adoption of technology is the key here. Innovators are reliant on growers to adopt, and adoption is linked to scale. So, there is a challenge there to create technology that is accessible and affordable in order for the industry to progress for everyone.



Kylie Horomia :
AgriTechNZ
growth &
transformation
manager

? How can New Zealand's growers and tech innovators better collaborate?

Historically, New Zealand has been known as a test bed for new technology. We're a small multi-cultural, English-speaking nation and have been used to trial everything

from new mobile apps to payment systems like EFTPOS (Electronic Funds Transfer at Point of Sale). It would be great to see more agriculture technology solutions tested here in New Zealand. Trials are a valuable part of a product lifecycle and any farmers or growers that take part in the process are helping to create systems that can make real positive impacts on production and sustainability. There is great value on both sides for trials to be undertaken here in New Zealand before moving offshore. New Zealand is a great location for trialling due to our climate and soil variability as well as huge research expertise across all sectors of agriculture.

? Why is New Zealand's agritech so focussed on dairy and beef & lamb?

Horticulture has a large variety of vegetable and fruit categories, which makes it tricky to get wholesale large-scale technology adoption or investment due to differing needs. There are some standout examples of technology

(including science and research efforts) within horticulture including Zespri's development of proprietary cultivars and implementation of advanced orchard management systems, or T&G's NZ\$100m state-of-the-art post-harvest facility in the Hawke's Bay that will pack more than 125,000 tonnes of apples. Alongside is the stellar scientific work that Plant & Food Research is doing in plant and pest disease and biological controls for crop management.

? Is there enough investment in hort-tech?

Investment in horticultural technology is increasing, but there is a need for more. One of the challenges is the fragmented nature of the horticulture industry, with many small to medium-sized enterprises (SMEs) that may lack the capital to invest heavily in technology. Collaboration among big horticulture players, supported by government and private sector investments, could transform the landscape of New Zealand hort-tech.

? Are we training our workforce to be hort-tech leaders?

While there are excellent programmes and research institutions dedicated to horticulture, the industry would benefit from a more concerted effort to integrate tech-specific training and innovation-driven curricula.

Encouraging collaboration between educational institutions, research bodies and industry players is essential to build a robust pipeline of skilled professionals equipped to drive the sector forward.

Education also includes exploring international best practice and being able to talk to other growers or innovators on technology overseas. Although New Zealand is a leader in innovation, there is always something to be learnt from the global ecosystem.

? How do you see the hort-tech sector growing in future?

We see great potential for international collaborations – whether between farmers, growers or agritech businesses. It's through collaborations the sector will move faster and be more attractive to offshore investors into our technology. For example, the Horizon Europe Programme lends itself to European collaborations – which some New Zealand organisations have already taken up. New Zealand delegations visiting international establishments also showcase our efforts and champion the work being done on the ground. ●

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FruitMinder's Sebastian Chapman (left) says lack of capital makes horticulture a tough industry to develop technology for, but there are exciting systems emerging

Orchard data in the palm of your hand

Developing new technology is key to tackling some major challenges facing the horticulture industry. HELENA O'NEILL takes a look at two emerging systems that deliver instant information to orchardists and growers and have the potential to cut back on some labour tasks and reduce water use.

FruitMinder is a mobile-first data collection tool with real-world and real-time analytics all in the palm of a grower's hand. FruitMinder founder and chief executive Sebastian Chapman says an orchardist can track the type of fruit, what was sprayed on it and when, how the plant was pruned, and the eventual yield.

The app was created after Sebastian met Mike Casey of Forest Lodge Orchard, a six-hectare, high-density cherry orchard in Central Otago. The property is now the app's trial orchard, with Mike Casey one of the company's directors.

"I had a walk around the orchard and we talked about how to make information better," Sebastian says. "And what we came up with was a concept similar to ear tags on cattle."



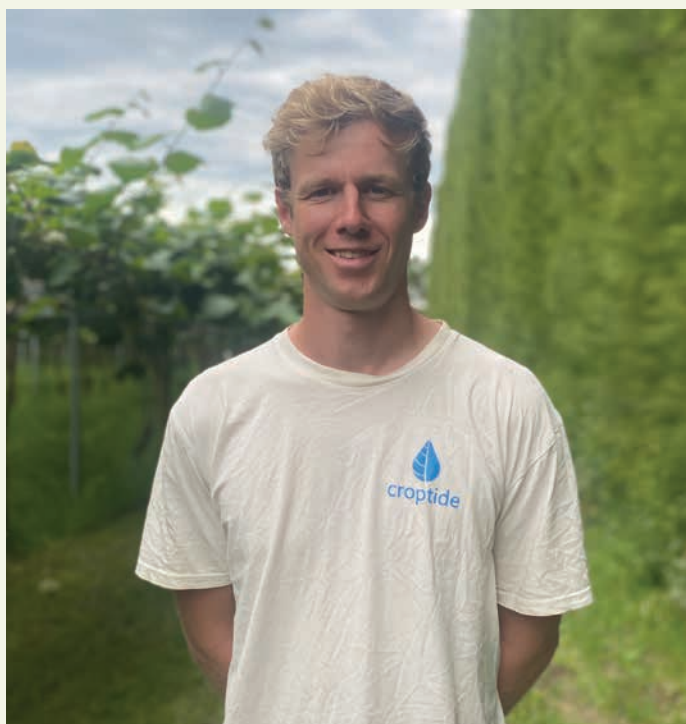
The system, still in its early stages, uses both a QR (Quick Response) code on a physical tag and its own virtual GPS (global positioning system) tag. Information is accessible through the FruitMinder app on cell phones or the web app, with as many users as needed for each account.

"I think a lot of people have been sold crazy, expensive systems that are over-complicated.

We've gone with a super simple system that seems to be everything that people need."

Simple enough that users with a variety of technology skill levels can all access the system.

"One of Mike's children has a tree that she has gone out and named, so by using the app she can go out and see her tree."



Hamish Penny created Croptide while doing an engineering Master's project supported by LandWISE

New technologies like these will be very beneficial to horticulture, and FruitMinder has been designed with the intent to integrate well with other systems.

"We've been keeping an eye on orchard sensors ... There are some pretty cool things coming out in New Zealand at the moment. Croptide is one that we've looked at a fair bit. We'd love to get some of their bracelets on our trees and do some trials with them. There are a few soil probes that are hitting the market now which should be better than what is out there, although a lot is still in the development stage."

“

I think a lot of people have been sold crazy, expensive systems that are over-complicated

Sebastian says the technologies used by FruitMinder and Croptide are excellent tools for orchardists, growers and farmers, especially when running trials on trees and crops.

"It's part of the Kiwi ingenuity. Growers are all trialling what works and what doesn't, from what pruning strategy is the best to using seaweed to fight frosts. Hopefully, we can help them keep track of all their experiments."

Using automation to capture data and carry out some orchard tasks allows labour to be used more efficiently.



FruitMinder

A mobile-first data collection tool with real-world and real-time analytics all in the palm of a grower's hand



Croptide

Attaches directly to plant stems to analyse and assess the plant's hydration, with data transmitted directly to the grower via an app





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The Croptide device attaches directly to plant stems to analyse and assess the plant's hydration

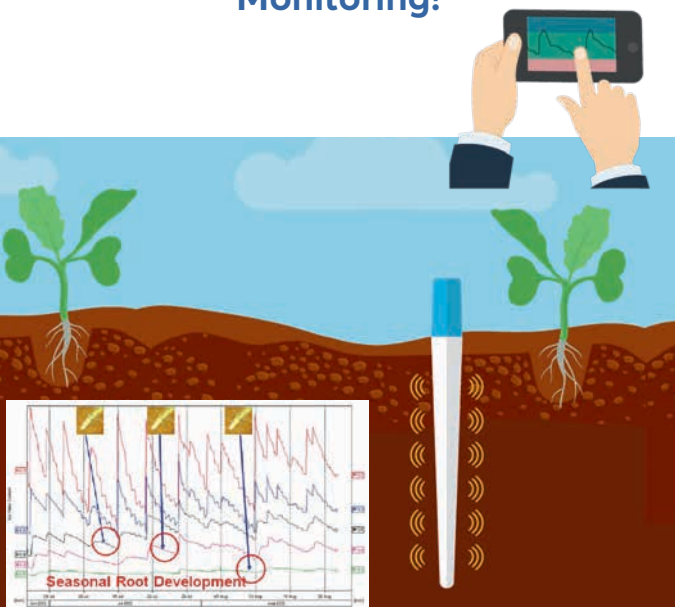



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"To get the most out of any of this technology, it has to be a derivative of automation. Labour is so expensive and everyone is already time-poor so the guys out there building robots are definitely going to be the ones that pave the way for a lot of the change."

Sebastian says there is also some really exciting work out of the University of Canterbury that FruitMinder is working with. The UC Vision team has developed a camera bar that can be mounted on a tractor or an autonomous robot. This camera bar takes images of the tree from multiple viewpoints and uses them to reconstruct the tree in 3D, with such levels of detail that you can see spiderwebs or aphids. From there they can run computer vision algorithms over the data and detect traits about the plants.

“

Horticulture is a tough industry to develop technology for, with most orchards and farms having money tied up in capital expenditure

The UC Vision website says the immediate outcome of the research will be a new tool for the country's viticulture sector to better estimate and optimise harvest yields and an opportunity for Kiwi agritech companies to develop a new high-tech product for domestic and international markets.

The next stage will be to align and expand the technology for the horticulture sector, particularly for fruits like kiwifruit, apples and emerging fruits (avocados, cherries, blueberries).

The UC Vision team is also working on a tree modelling project that has the potential to automate tree pruning on orchards. The research aims to push the data science boundary for fully automated tree modelling and will create capabilities for modelling individual tree growth at a national scale, establishing the foundation for large-scale urban planning studies and forestry management practices.

Horticulture is a tough industry to develop technology for, with most orchards and farms having money tied up in capital expenditure.

"If you have an extra dollar, you usually service your debt rather than spending it on someone else," Sebastian says.

“

The UC Vision team is also working on a tree modelling project that has the potential to automate tree pruning on orchards

Water and plant hydration are major challenges for orchardists and growers, often expensive, and based largely on guesswork. Hawke's Bay-based startup Croptide aims to give growers access to first-hand plant hydration information, straight from the plant itself.

Hamish Penny created Croptide while doing an engineering masters project supported by LandWISE in Hawke's Bay, investigating electricity in plants.

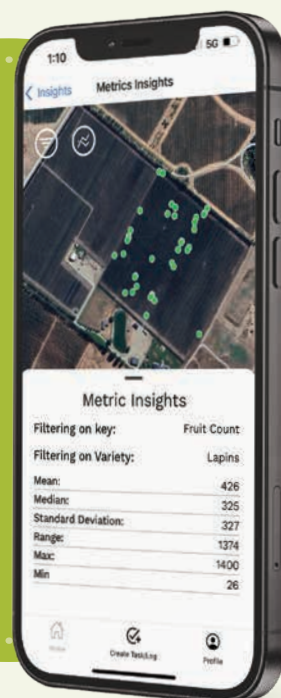
"I came across a modern measurement technique for analysing biological tissue and met several wine and apple growers in Hawke's Bay who were very interested in having real-time data directly from plants, particularly focused on water status. We were able to set up an initial proof of

concept with Villa Maria and T&G in 2019 in Hawke's Bay where we proved it was possible."

The Croptide device attaches directly to plant stems to analyse and assess the plant's hydration, with data transmitted directly to the grower via an app.

"This allows us to help growers continually build precision on the optimal management to achieve better yield and quality outcomes with less water, fertiliser, carbon emissions, labour and other inputs," Hamish says.

FruitMinder's mobile app showing data from Forest Lodge Orchard in Central Otago



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BAY OF PLENTY TRACTORS



FruitMinder, still in its early stages, uses both a QR (Quick Response) code on a physical tag and its own virtual GPS (global positioning system) tag

Key initial crops are wine, apples and kiwifruit.

"We had over 100 paid commercial pilot sites across Marlborough and Hawke's Bay in 2023-24 with best-in-class companies such as T&G Global, Zespri, Rockit, Pernod Ricard, Cloudy Bay, Yealands and Villa Maria."

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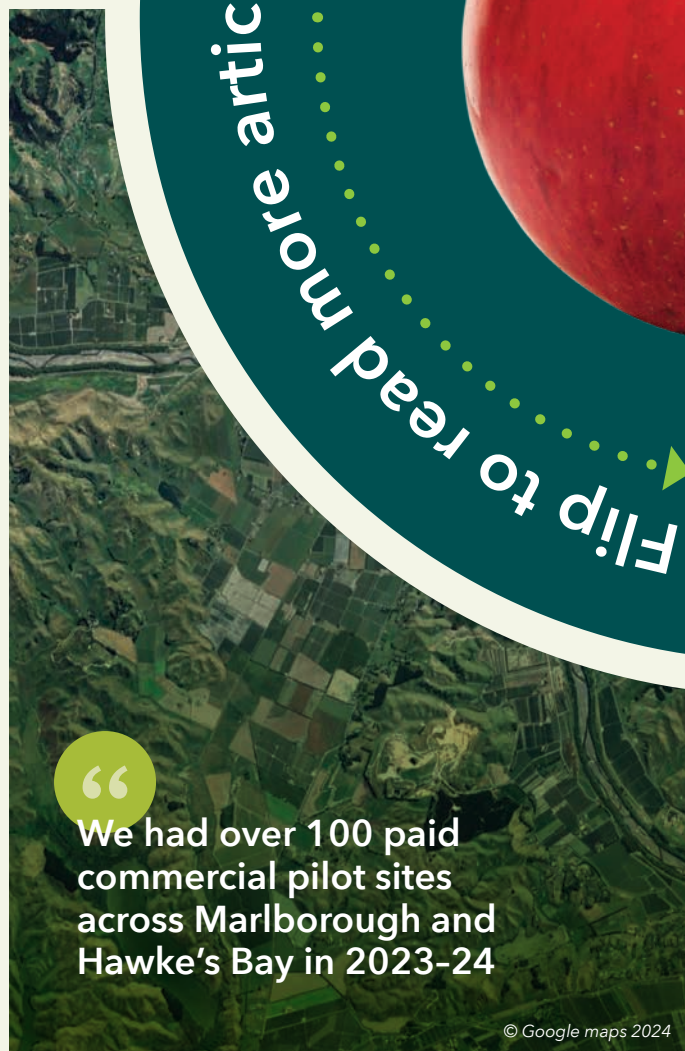
Croptide's benefits apply to any permanent crop

"The feedback from growers has been very positive, with some of the most useful insights being around plant performance in Hawke's Bay post-Cyclone Gabrielle and in Marlborough over their very dry summer. Plant stress could be identified in real-time and plant responses to key actions for managing critical fruit size, quality and yield were provided to customers."

Hamish says Croptide's benefits apply to any permanent crop, with the potential for stonefruit, nuts, cherries, avocados, citrus and others.

"The benefits are the ability to optimise management to give plants exactly what they need and adjust strategy in real-time based on plant responses. This leads to optimisation of fruit quality and yield, plus minimising the environmental footprint of production."

Hamish says the company has received a substantial amount of interest from new growers in Hawke's Bay and Marlborough and expects to have a significant number of new customers coming on board for the coming season. ●



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We had over 100 paid commercial pilot sites across Marlborough and Hawke's Bay in 2023-24

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