NZGROWER®

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HORTICULTURE NEW ZEALAND

PEPPER PERFECTION

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Southern Paprika, see page 20.
Photo by Helena O'Neill.

WHAT'S NEW

A regular advertorial section of new products and services. This publication does not endorse the products or services featured here.

SEASONAL LABOUR – WHAT IS THE SOLUTION?

Words by Barry O'Neil, President : Horticulture New Zealand

The looming, huge shortage of seasonal labour in horticulture is very real – isn't it?

Our understanding is that we already have seasonal labour shortages for the spring harvests, including asparagus, strawberries and courgettes. From November, things will start to get really challenging as some of the bigger sectors come online with their labour requirements. For example, the cherry industry will need 7,000 workers, while the apple and kiwifruit industries will need the full complement of 14,400 RSE (Recognised Seasonal Employer) scheme workers, and 20,000 backpackers who usually make themselves available for seasonal work, including harvest and packing.

But when we talk to government officials, they don't accept there is an imminent and critical labour shortage. While we would expect the government to put pressure on our industry to employ New Zealanders rather than use migrant labour, what I don't get is their estimate that we will only be short by somewhere between zero and 4,000 workers. It's very unfortunate that we don't actually have figures from the government as to the numbers of RSE workers and backpackers that are still in New Zealand.

My simple maths suggests that with less than half our normal number of RSE workers and backpackers available, we will be more than 10,000 workers short. However, not all backpackers work in horticulture, and RSE worker numbers are falling as repatriation flights get them home, so it could be worse!

Some officials think we are crying wolf. They say they hear these crisis demands every year from the food and fibre sector. They say that now we have 7% unemployment, there's a new cohort of unemployed that actually want to work, so we are exaggerating the situation.

Unfortunately, it's not clear what the actual shortage is going to be as it's really complex, based on the employment approaches of individual businesses, industry and sector timeframes, regional demographics, turnover rate, and so on! Another unknown factor is how many Kiwis can we attract into these jobs?

On to the good news, I have been really impressed by the efforts and strategies being applied to attract Kiwis into horticulture roles, but unfortunately, I don't see this being able to fill the numbers of seasonal roles that are vacant. Horticulture New Zealand and the Product Groups have worked proactively and constructively with government agencies, to develop approaches to attract more Kiwis into seasonal horticulture work. While we have had a good response, we are nowhere near the numbers needed. There are also significant efforts underway from individual horticulture businesses to attract New Zealanders into their operations, but again relatively small numbers have so far taken up this opportunity.

As Seeka recently experienced, people come and go, they don't always stay. The company was forced to recruit more than 900 New Zealanders to fill 240 jobs in the kiwifruit sector during the Covid-19 lockdown, because they kept quitting.

We all recognise that the seasonal nature of the work, spread out regional locations, and it sometimes being hard physical work, mean that not all Kiwis want this type of work or are suited to it. And not all regions can be considered the same. For example, some of our regions don't have large numbers of New Zealanders living nearby that can come and work. There also isn't the accommodation available to house people, and so backpackers in vans have filled some of the needs until now.

> **"We need to rethink, if we haven't already, the harder physical work areas, including more flexible work arrangements, or perhaps more frequent and shorter shifts?**

I reject arguments that the sector does not pay sufficiently to attract New Zealanders. We have had many experiences of people moving into horticulture from the closed down hospitality or tourism sectors, who were able to make more in these seasonal roles than they were previously. The Prime Minister has told me of people she knows who were made redundant from Hobbiton who made more picking kiwifruit than they were earning there.

So what can we do to get out of this situation, both in the immediate short term but also looking at it from a longer timeframe?

Most important to me, we must absolutely work collectively to fully understand the situation and explore how we can share and more efficiently utilise the labour we have available. I had felt previously we were too protective of our seasonal labour. We manage to get it into our sector so we don't want to lose it to others. This behaviour and attitude had to change.

Multiple initiatives are underway to attract New Zealanders into seasonal work. The Work the Seasons website shows the opportunities, but then sectors are doing their own pitch, such as Summerfruit's 'work, play, stay'. Horticulture New Zealand has also developed some great stories about how RSE workers have enabled Kiwis to get into horticulture.

Our lobbying as a collective sector to allow workers stranded in New Zealand to continue working has been supported by the government. We are now focusing our efforts on getting RSE workers into New Zealand from Covid-free Pacific Islands. We still have an urgent need for these hard-working people, without which we just won't achieve the harvest or packing outcomes needed.

However, looking medium to long term, wherever possible we need to move away from seasonal labour. Employing permanent workers has to be the goal, as not having access to seasonal staff or trying to recruit and then train someone who lasts only a week is a total waste of time. Working collectively to align different industry and sector needs, identifying job sharing opportunities at different times of the year, and between businesses, is one way to achieve this.

We need to rethink, if we haven't already, the harder physical work areas, including more flexible work arrangements, or perhaps more frequent and shorter shifts? And rotating roles rather than doing the same repetitive thing day after day.

14,400
RSE WORKERS &
20,000
BACKPACKER WORKERS
USUALLY AVAILABLE

Yes, I hear you saying 'but it all costs'. My response to this is, if we can't harvest and pack our fruit and vegetables at the optimal time or worst-case scenario, not at all, then it will cost even more.

The real goal is significantly increasing our efforts into removing the hard physical work of carrying heavy picking bags, climbing ladders, bending over all day, along with the repetitive physical work, wherever possible.

Automation has to be how we address long-term, the ongoing labour uncertainty and the government's lottery of RSE cap numbers every year. We don't have to wait until we have a fully automated robot to do the job. Rather, I think it's a step-by-step process initially supporting the workers. We need to look at today's technology and what we can introduce into our operation to assist with some of the hardest parts of the work – whether that be, for example, platforms or conveyer belts. Then we need to think further about our growing systems, and what we can do differently to enable automation to be introduced.

Automation is here and available now in our packhouses, so our efforts need to focus on growing and harvesting. We are not alone. This is an issue the world is challenged by, but Kiwi ingenuity will go a long way to solving hard practical challenges like this. And yes, it will cost, but this is one of the key investments we need to be making to secure our future.

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NEW GOVERNMENT'S APPROACH TO ISSUES FACING HORTICULTURE

Words by Mike Chapman, Chief Executive : Horticulture New Zealand

A new government is taking office and there will be a new approach to many of the regulatory issues that have a direct impact on horticulture.

Before the political parties started their campaigns, we put to together an election manifesto listing the key issues our sector needed to have addressed. It was pleasing to note that some if not nearly all of our points were picked up by the key political parties. But that was before the election.

The make-up of the government will determine the direction of travel for the next three years. What was said pre-election may very well not be what is policy post-election. (This column was written before the new government was formed.)

There are, however, some certainties going forward. The most critical for the incoming government is how to turn around the recession that is now gripping New Zealand, with GDP at minus 13.4. Pre-Covid-19 policies are simply not applicable anymore. To pull New Zealand out of recession, the government will need to back winners and enable those winners to succeed. This will be no easy task in the Covid-19 world order. Europe is going into another series of lockdowns as Covid-19 is once again becoming prevalent as winter bites in the northern hemisphere. This is an indicator for New Zealand and brings with it the very real prospect of further lockdowns here.

What we have learnt the hard way with lockdowns is they make economic survival very difficult. If borders are put in place like the one in Pukekohe earlier this year, continued production is significantly hindered. Along with the Product Groups, Horticulture New Zealand has made submissions to the government about what can be done to lessen the impact of lockdowns on horticulture. In particular, border placement and how borders can be effectively and far more efficiently operated.

The one area where our submissions have not been given effect to is the opening of independent fruit and vegetable retailers. The closure of these retailers, farmers' markets and restaurants not only greatly restricts healthy food getting to those who need it but also as you well know, takes away outlets and income. Our ability to economically and mentally withstand further lockdowns is greatly reduced. As the head of the World Health Organisation has pointed out, lockdowns directly create poverty.

The only way New Zealand is going to recover is for us to grow our way out of economic decline. That can only be done by our primary sector with horticulture contributing is a very significant way. But to do this, we need to maintain and grow our productivity, and the only way to do that is for water and labour to be available.

It is clear that New Zealand is becoming drier, and in our key growing areas. Water storage needs to be expedited by the new government. Paradoxically, labour remains an issue although there are many more New Zealanders looking for work. The issue that we face is New Zealanders do not want to do field work, but unless our crops are harvested there is no healthy food for New Zealanders and no export income generated. (This issue is extensively covered in the President's column.)

> **"The focus for the new government must be on enabling horticulture by addressing two of our most urgent concerns: water storage and adequate labour from both within New Zealand and Covid-free countries in the Pacific**

Therefore, the focus for the new government must be on enabling horticulture by addressing two of our most urgent concerns: water storage and adequate labour from both within New Zealand and Covid-free countries in the Pacific. ●

YOUR LEVY AT WORK

INDUSTRY WIDE ISSUES FOR INDUSTRY GOOD

10 SKILLED STUDENTS WIN COMPETITION

NATURAL RESOURCES AND ENVIRONMENT

AIR

Northland Regional Plan – Agrichemical Mediations

Horticulture New Zealand continues to participate in mediations in Northland regarding rules to manage potential effects from agrichemical application. The main outstanding issue is managing risks to spray-sensitive areas.

The provisions within the proposed plan prevent any spraying within 100m of a spray-sensitive area, when the wind direction is towards that area. Our position is that the wording of the current rule is too blunt and would prevent spraying when in practice the effects can be safely managed using good management practices.

HortNZ in consultation with Product Groups and growers have developed a proposal to try and resolve this issue. The focus of the HortNZ proposal is to enable growers to manage risks through a range of methods.

WATER

Northland Regional Plan – Water allocation

Horticulture New Zealand is participating in an Environment Court Hearing on the water allocation topics. The decision version of the Regional Plan provided (through a consent process) for water allocation at times of low flow to provide for rootstock survival and at high flow to provide for harvesting of stream flow for water storage. These provisions were appealed by a number of parties seeking to constrain these allocations.

HortNZ's evidence demonstrates that a small allocation for root survival water can be provided for with negligible environmental effects. HortNZ's position has been supported by the Department of Conservation in their evidence.

HortNZ supports provision for high flow allocation. Flows can be harvested when streams are above median flows without reducing the frequency of flushing flows. HortNZ is opposing the proposal from the Department of Conservation that seeks to severely constrain the volume of water available for harvesting.

LAND

Selwyn District Plan

Selwyn District Council has notified the Proposed Selwyn District Plan for public consultation. HortNZ will review the proposed Plan, undertake consultation with growers and prepare a submission in the best interests of growers. Key matters that are managed by the District Plan include:

- Land zoning and subdivision – managing how land use change can occur and where urban growth is located.
- Reverse sensitivity issues for managing conflict between land uses (including things like noise, light, standards for sensitive activities.
- Provisions for buildings and structures, such as glasshouses, packhouses, worker accommodation and crop protection structures.
- Storage and management of hazardous substances.
- Protection of special features and landscapes.

CLIMATE CHANGE

He Waka Eke Noa – Measuring and Managing Emissions Guidance

HortNZ is participating in the government primary sector climate change partnership. He Waka Eke Noa is focused on reducing emissions using a Farm Environment Planning approach. For growers the main agricultural emission is nitrous oxide from fertiliser.

The first milestone of He Waka Eke Noa is that guidance is provided to farmers on how to measure and manage greenhouse gas emissions through farm planning by 1 January 2021. An early draft of this guidance has been shared with Product Groups and a grower reference group for comment. Wider consultation will occur towards the end of this year.

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NEGLECTED TREES CAN HARBOUR UNWANTED PESTS AND DISEASES

Words by Anna Rathé : Horticulture New Zealand Biosecurity Manager

Did you know that fruit trees, vines and vegetable plants on your property or in your neighbourhood can pose a biosecurity risk if they are unmanaged?

Neglected plants can become a reservoir for damaging pests and pathogens to flourish, multiply and potentially spread to infect other plants nearby. If you are carefully managing your crop to keep pest loads low it would be very disappointing to have regular infestations of insect pests or pathogens originating from unmanaged plants in the surrounding environment.

Unmanaged plants can occur at a range of scales, including:

- Individual backyard fruit trees
- Wild plants in riparian areas
- Abandoned commercial orchards

Unmanaged plants can occur at a range of scales, including:

INDIVIDUAL BACKYARD FRUIT TREES | WILD PLANTS IN RIPARIAN AREAS | ABANDONED COMMERCIAL ORCHARDS

Knowing where unmanaged trees are located can also be important if there is a new incursion. Host mapping is often a critical step in a biosecurity response to enable surveillance and control activities to be targeted, and make sure that no potential host plants in the detection area are missed.

Untended fruit trees, vines or vegetable plants on your own property, especially those from the same family as your commercial crop, should be managed or removed. It is best for growers who are exiting the industry to destroy trees if the orchard is going to be abandoned.

Untended plants on your neighbour's property or council or crown land is trickier. If appropriate, have a conversation with your neighbour to let them know that you have concerns about the pest load on their backyard trees and the impact that this may have on your growing operation if the pests or pathogens spread to your property. Don't take action to manage neglected trees on neighbouring properties unless you have the owner's permission.

> **"Untended fruit trees, vines or vegetable plants on your own property, especially those from the same family as your commercial crop, should be managed or removed**

Another good option is to check your regional pest management plan (RPMP) and contact your local council – some Regional Councils are starting to include Good Neighbour Rules in their RPMP for certain pests, pathogens or weeds. Good Neighbour Rules are intended to help manage pests spilling across boundaries. The rules require land occupiers, both private owners and the crown, to prevent certain pests from affecting environmental or agricultural values on adjacent properties.

If you see wild kiwifruit which can sometimes find its way into gullies and riparian areas, contact Kiwifruit Vine Health to report it. They work to remove wild vines in partnership with Regional Councils and landowners, preventing them from becoming a Psa source, and in doing so protect nearby commercial orchards from infection.

FUTURE HORT PROFESSIONALS WIN GLOBAL FOOD MARKETING CHALLENGE

Words by Emma Boase : People Capability Manager, Horticulture New Zealand

Lincoln Roper (pictured left) played a grower calling in to the fresh produce distributor (Grace Mainwaring, right) "It's hard work, but the celery's nice."

As part of the ongoing commitment to increase the skills, industry knowledge and networks of young students interested in the horticulture industry, Horticulture New Zealand and NZ Apples and Pears Inc. supported university students from Massey and Lincoln to enter the International Food Marketing Challenge, run by the Food Distribution Research Society.

Teams from around the world competed in the virtual competition, developing a strategy and implementation plan for a Florida-based fresh produce distributor that has been affected by ongoing Covid-19 lockdowns. The teams worked on managing the requirements of the distributors' growers, as well as the ripple effects from the consumer market.

The initiative is a first for the New Zealand horticulture industry, and was organised by the then capability research and engagement coordinator, Emma Boase. Emma worked with each team during two separate weekend workshop sessions.

"I was incredibly impressed with the commitment, creativity, and skills of all of the students during the challenge and the passion they are developing for the horticulture industry." This commitment was rewarded when the results of the challenge were announced, and Lincoln and Massey were placed first and second respectively.

Congratulations to Emma Ritchie, Grace Moscrip, Lincoln Roper, and Grace Mainwaring from Lincoln and Alexandra Tomkins, Kazi Talaska, William Robertson, and Euphemia Tan from Massey.

"It's an awesome result for New Zealand, for our students, and for horticulture. To come out number one and two in the world reaffirms that we are doing something right and the future for our industry is bright," said Emma.

The experience has been valuable for the students' professional development, and even enticed some to consider a permanent career in horticulture. Emma Ritchie, a Bachelor of Agribusiness and Food Marketing student at Lincoln said, "I found it really interesting researching about the horticulture industry, [and] was surprised at the scale of the industry. It is definitely an industry I would now be very keen to work in in the future."

Grace Moscrip a Bachelor of AgriScience student at Lincoln agreed. "The networking with industry professionals and creating contacts within the horticulture sector has been invaluable. The public speaking, presentation skills development I learnt from the challenge will be sure to help me in future years."

This programme would not have been possible without funding from AGMARDT (Agricultural & Marketing Research & Development Trust), Horticulture New Zealand, and NZ Apples and Pears Inc. Emma has future plans for nationalising the challenge model.

"I'd love to see this type of programme available to all university, polytechnic, and high school students in New Zealand. I think it's a great way to empower young people to solve real growers' problems in the industry while building networks and skills."

PROUD TO BE PART OF INDUSTRY CREATING VALUE FOR NZ

Words by Elaine Fisher

Global marketing manager for BerryCo, Mel Auld, visiting a consumer's home in Vietnam for blueberry research

The pride a Bay of Plenty orchardist showed when, in a Japanese supermarket, he invited a mother and daughter to sample kiwifruit he had grown reinforced for Mel Auld the reason she is part of New Zealand's horticultural industry.

"I had accompanied a group of growers of the sweet green kiwifruit to Japan where we watched sampling in a large supermarket. The growers were checking Kpins on the trays to find their fruit when I saw Ross Bawden of Pukehina, with tears in his eyes, proudly holding a tray of his fruit," recalls Mel.

Ross shared some of the fruit with a mother and daughter, telling them, through an interpreter, that he had grown it. They in turn thanked him and said the fruit was delicious.

"It was a heart-warming moment which enabled growers to connect with their customers and illustrated the passion growers have for what they do and how proud they are to grow fruit which is healthy, delicious and of such high quality.

"That's why I'm in the horticultural industry. It is creating value for New Zealand and is full of great people who are down to earth, deeply caring and have the grit to get through tough times like Psa-V, the attack on Zespri's single desk status, and Covid-19," says Mel, a former Zespri global marketing manager, and now global marketing manager for BerryCo.

Also a member of Women in Horticulture, Mel describes herself as a passionate environmentalist and is inspired by some of the changes happening in the primary sector.

"I'm looking forward to a greater focus on human practices (including farming) that are regeneratively aligned with the ecological systems they're a part of. In addition, I'm a big supporter of improved representation of women, youth and different ethnicities on leadership and governance teams that will bring fresh perspectives to enliven discussions and outcomes."

Her working life began in the hospitality sector. Mel grew up immersed in nature at Lake Okareka near Rotorua and attended Rotorua Lakes High before completing a course in hotel reception at the Waiariki Polytechnic. She then worked at THC Waitomo Caves Hotel and the Royal Lakeside Novotel Rotorua as part of the opening team.

That was followed by working in London, and then with four great mates, travelling Europe in an orange Kombi Van called 'Tumeke'. One of

Women in Horticulture member Mel Auld is a former Zespri global marketing manager, and now global marketing manager for BerryCo

those mates was Bran Auld from Dunedin. "We fell in love in Rome in 1999 and have been together ever since." The couple, who now live in Tauranga, have two sons.

When Mel returned from her OE she joined Carter Holt Harvey's communications team in Auckland. That was where Mel experienced first-hand how influential a mentor can be. "My manager, Dellwyn Stuart, was a staunch leader who encouraged and supported my continued education, giving me the opportunity to complete a graduate diploma in communications and public relations, for which I am forever grateful."

Later Mel worked for SkyCity as part of its investor relations communications management team. It was while she was there that Mel was offered the role of communications manager with Zespri in Mount Maunganui and the prospect appealed. "It felt closer to heartland NZ and people working the land. It was the complete opposite to SkyCity."

Turners & Growers' legal challenges to dismantle the Zespri single desk status (under which only Zespri can market New Zealand grown kiwifruit to the world (except for Hayward green to Australia) was among the big comms projects Mel headed.

"The overwhelming support growers showed for the single desk through surveys we did, reinforced the commitment to stand firm in the long campaign to defend it. The positive to come out of the challenge was the unity it created among growers."

The strength of that unity was again demonstrated when the vine disease Psa-V was discovered on a Te Puke orchard in late 2010. "I was communications manager at the time, and I remember the longest of the long days the team worked was 22 hours."

Mel is proud of how the industry came through the crisis, how growers were supported, and despite the incredible stress they were under, there were no suicides. A new gold G3, with tolerance to Psa-V, had just been released enabling the industry to quickly recover.

In 2018 Mel left Zespri to focus on family and her transformational coaching and consulting business. By early 2019 Mel was asked to join BerryCo. The company licences New Zealander growers to grow blueberries sourced from Mountain Blue Orchards in Australia. "These berries are large, crunchy and exceptionally delicious, unlike any blueberry I've ever seen in New Zealand."

To date, 80ha of the licensed varieties are growing in New Zealand for local market and for export to Asia, with major markets including Vietnam, Taiwan and Singapore. Mel has visited the markets and says there are plans for a new brand launch next year which will differentiate BerryCo blueberries from the competition, strongly resonating with consumers and bringing more value back to growers.

To keep up to date on Women in Horticulture news and activities, join our membership database by emailing **info@women-in-hort.nz**. We welcome everyone in New Zealand horticulture who is interested in this exciting initiative.

NZGAP CONTRACTOR STANDARD – TO BE LAUNCHED IN NOVEMBER

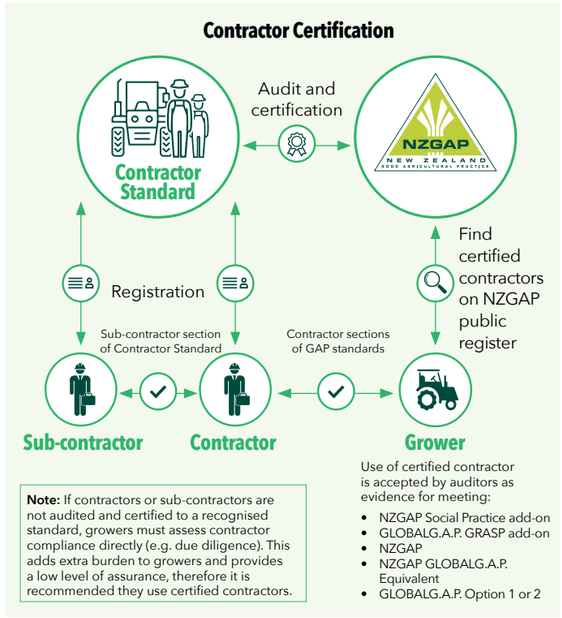
Words by Damien Farrelly : NZGAP and Food Safety Manager at Horticulture New Zealand

Corporate social responsibility is an increasingly important issue in the global food supply chain, with all players being asked to demonstrate that food is produced in line with internationally agreed labour requirements and relevant national legislation.

As a result, supermarkets in New Zealand and overseas are increasingly seeking Social Practice certification in addition to the core GAP (Good Agricultural Practice) Food Safety certification. Regulators are also promoting certification in horticulture as it is considered a high-risk industry regarding worker welfare. This means that contractors are in the scope of Social Practice certification. International legislation such as the Modern Slavery Acts in Australia and the United Kingdom are having a knock-on effect on supermarket sourcing policies, as they are now required to report on social responsibility all the way to grower and contractor level on the ground in New Zealand.

NZGAP is launching the Contractor Standard in November to certify contractors independently, thus reducing the compliance burden on growers and enabling them to check the status of contractors on the new NZGAP public register for contractors (e.g. registered, approved, suspended, cancelled). The NZGAP Contractor Standard also enables contractors to effectively demonstrate compliance to multiple growers and horticulture operators to whom they supply services in a credible and transparent way. Certification will be available to a range of contractor types including harvest contractors, agrichemical applicators, fertiliser applicators, packhouse handling and services, pruning/thinning, leaf plucking, and beekeeping. While growers can complete a due diligence assessment of contractors for inclusion in the scope of their own certification, it is recommended that contractors are independently audited and certified so that they can demonstrate compliance to all of their customers via one integrated assurance system.

The NZGAP Contractor Standard has been benchmarked to NZGAP, NZGAP GLOBALG.A.P. Equivalent, NZGAP Social Practice add-on, GLOBALG.A.P., and GRASP (GLOBALG.A.P. Risk Assessment for Social Practice),



meaning certified contractors will be able to provide services to any NZGAP or GLOBALG.A.P. certified grower or supply chain operator. NZGAP is also collaborating with Master Contractors and Zespri on implementation of the Contractor Standard to ensure alignment and coordination of an effective assurance system for contractors.

Growers are ultimately responsible for the business practices of contractors they use on their properties, including how workers are treated. The common practice of using contractors, especially for seasonal tasks, means that certification is an effective pathway for contractors to demonstrate compliance to growers, and for growers to engage the services of contractors with confidence. Those certified to the NZGAP Contractor Standard will be able to demonstrate that they meet recognised social practice standards such as employment law and ethical standards. In other words, that they are looking after their most important resource – their people.

NITRATE SITUATION CLARIFIED

A *NZGrower* writer raised some hackles in the story "'Perfect Storm' Ups Interest In Natural Growth Agent" (September, 2020) when quoting that, over the last three decades, the amount of nitrate fertiliser added to New Zealand soils had accelerated with a corresponding loss of close to 200 million kilograms a year leaked into waterways and aquifers.

Rightly so – that figure referred to the practice of animal farming and that was not made clear in the article, and for that we apologise.

While researchers say getting accurate figures for vegetable growing is difficult, growers ARE paying attention. Either through a determination to position themselves well in the market, or simply a desire to apply best practice, growers are working to address environmental issues, ahead of regulation.

To that end, Horticulture New Zealand has long been doing its part in supporting growers in the development of better land management practices, mostly recently through Farm Environment Plans.

This month, *NZGrower* sister magazine *The Orchardist* talks to a Gisborne industry professional (page 10) who urges growers to get stuck into their Farm Environment Plans, because it's "good to do".

> **"Horticulture New Zealand has long been doing its part in supporting growers in the development of better land management practices**

And here in *NZGrower* on page 50 we update the progress of a two-region trial that is developing and testing new techniques for nitrogen application and mitigation that will be good for the environment… and for the bottom line.

YOUR INDUSTRY

ACROSS THE SECTOR – ACROSS THE COUNTRY

FRESH TOMATOES EVERY DAY

Words by Glenys Christian

Greg Prendergast has spent the last 42 years in the glasshouse tomato industry.

But now the managing director of Rohe Produce believes it's time to take things to the next level with construction of almost nine hectares of high-tech glasshouses set to begin in Northland early next year.

The glasshouses, to be built on a large block of bare land at Marsden Point at a cost of $70 million, are the largest to go up in this country since 2003. Financing arrangements, which include a $14 million loan from the government under the Provincial Growth Fund (PGF), building consents and contract signing are set to be completed by the end of the year. The construction process which will deliver 200 jobs over the next 12 to 18 months is likely to get underway early in 2021. But there's an element of risk with Covid-19's possible effects on the manufacturing of the glasshouse components to be sourced from the Netherlands.

A team of experts from around the world will be brought to this country as consultants to set up and run the organic system, not previously seen here, which Greg believes is the next step in tomato production.

In 2003 Greg left this country to work in Australia, which has since seen a huge increase in tomatoes grown under glass. He set up 8.2ha in South Australia when he arrived that's now grown to 54ha, with the national total reaching 250ha, due to it becoming more difficult to grow the crop outside because of weather events and fruit fly.

Returning to New Zealand in 2015, he found the 120ha of tomato growing operations here had not changed since he left, meaning a majority of the glasshouses are nearing 30 years old. So he says it's a case of getting the local industry back on track.

"Corporates and large growers haven't done it so someone's just got to take it on the chin."

Planning of the venture has been underway for the last 18 months. The glasshouses will be able to tap into carbon dioxide being released from the Marsden Point Refinery, which will reduce emissions. And they will use 100% LED (light emitting diode) lighting, which will increase production by at least 50% per square metre, especially during the winter when local supplies often dwindle and become more expensive to buy.

Greg Prendegast – new career path provided

With the Closer Economic Relations (CER) agreement back in the 1980s, Australian tomato growers were allowed access to the New Zealand market. So not only will the Rohe Produce development show the new technology is viable, he believes it will spur consumers to buy more New Zealand tomatoes when they know they have the choice of a local organic product.

Tomatoes sold under the Rohe Produce brand will have less plastic packaging, which will boost their appeal because consumers can smell that what they are buying is fresh.

All categories will be produced, from truss tomatoes, to loose tomatoes, to cherry tomatoes; and plans are to eventually have them stocked at all supermarket chains up and down the country.

"And we will add value to the places where the glasshouses are built, because it's not just about making money," Greg says.

The close location to the Auckland market, with future competition between the transport options of truck or train is critical, he believes, as is the fact there aren't a great deal of long-term employment options in the north. With the expectation the glasshouses will be there for at least the next 50 years, young people in the area can be introduced to a career path in an industry many wouldn't have considered previously. There will be around 110 permanent jobs created once the glasshouses are in full production from 2022.

"We'll be upping the bar by paying the living wage," Greg says.

Rohe Produce will offer full-time employment for locals instead of the current opportunities in Northland of seasonal work during harvesting. Those positions are hard to fill with locals, so a large number of overseas workers are usually brought in.

"It's no wonder that in the past tomato growers couldn't get workers," he says.

The plan is to work with Northland iwi to provide wrap-around services to workers, with flexible working hours and a close-down period over Christmas and New Year for a holiday break.

SOME LIKE IT HOT

Words by Helena O'Neill

Blair Morris with some of the company's finest capsicums

An hour's drive north of Auckland is the country's largest single-site glasshouse grower of capsicums – Southern Paprika Ltd.

The Warkworth site features 16 glasshouses of varying sizes between 1 hectare and 4 hectares (totalling 26 hectares), with the newest glasshouse completed in October last year.

They form four complexes hosting almost a million capsicum plants, which each produces around 40 capsicums per season. The original 1-hectare glasshouse at Point Wells remains in use as a small nursery.

Southern Paprika Ltd (SPL) general manager Blair Morris says the company's three biggest challenges are labour, water and energy.

Labour remains the company's single biggest cost, with 170 onsite staff and an annual wage bill of more than $6 million.

"One of the things that gets overlooked is that as the minimum wage goes up, our job numbers go down. It pushes money to innovation and technology as we strive to keep costs down."

Water is another focus, with groundwater needed in the drier months.

The company is expanding its catchment systems, has covered one of its three dams, and has secured consent for a fourth. SPL can currently store 95,000 cubic meters of water.

The plants are hydroponically grown being fed a mixture of water and nutrients through a small feeder tube placed next to the base of the plant. Carbon dioxide (CO_2) is also fed to the plants from a plastic hose to help them grow.

The glasshouses are heated with natural gas. Gas heats water which runs through pipes in and around the glasshouse. This controls humidity (relative humidity is between 85% and 90%) and the daytime temperature inside the glasshouse ranges between 21 and 28 degrees Celsius.

As heating the glasshouses is so important, the company has to consider the best energy options to future-proof its operations.

"One of the problems with gas is its volatility, the long tail of gas supply and reserves. We can no longer depend on it… there's a lot of risk attached.

"I would love hydrogen but there's nothing commercial at this point in time."

Southern Paprika grow red, orange, and yellow capsicums along with the unripe green capsicums.

The popularity of capsicums changes throughout the year, with the red and green fruit in demand in winter while the orange and yellow capsicums are more popular over the warmer months, Blair says.

The bulk of SPL's crop is made up of two 'bell pepper' varieties of capsicum, Mavera and All-rounder, along with a small number of Palermo capsicums.

The Palermo is not the traditional blocky shape normally associated with capsicums but is pointy with an elongated or curved shape with softer skin and very few seeds inside. It is sweeter than normal capsicum but retains the same nutrients.

While the Palermo capsicums are grown for the Japanese market, SPL plans to soon introduce them to the domestic market.

Blair says the company focuses on how to get prices low for their consumers rather than controlling the market.

Last year they moved to a 12-month operation from a September until June harvest season.

“We fruit each week and aim to meet the whole demand each week. Consumers want to get a fresh capsicum for each day of the year.”

The business used to be heavily weighted to export but is now between 75% and 80% domestic market.

“We’re not wholly reliant on the international market. It’s just the over-volume that we push offshore.”

Despite the bulk of SPL’s capsicums going to the domestic market, the company hasn’t avoided the effects of Covid-19.

The massive reduction in international air freight means their capsicums are now being shipped by sea to Japan – a two-week voyage instead of a two-day travel time.

Likewise, the pandemic has impacted SPL’s workforce including the 45 people employed under the RSE (Recognised Seasonal Employer) scheme.

“We have RSE workers here and they couldn’t go home. It’s been very hard on them. We’ve had protocols in place to give them work all the way through.”

Blair says the RSE scheme has been very good to the company, particularly with the warm glasshouse environment which is similar to the home climates of its workers from Kiribati and Tuvalu.

"In recognition of the importance of the RSE scheme, the company has a pastoral care programme where we actively assist them to manage all their personal needs, including but not limited to medical [and] financial issues and anything related to assisting them integrating into the community.

Alexander Cropping Limited (ACL) was started by Hamish and Robyn Alexander in 1984, leasing land and growing crops of melons and field capsicums for the domestic market.

After five years of growing field capsicums at ACL, production was moved under cover to improve quality, marketability, and increase production. This led to the construction of a 1-hectare glasshouse at Point Wells.

Southern Paprika Limited (SPL) was formed in 1998 as a joint venture between ACL and The Levarht Company of Holland. The project was built on ACL’s strength in growing and as a solution to supply capsicums to Levarht’s customers in Japan from New Zealand in the northern hemisphere winter. The venture began with the construction of a 2.5-hectare glasshouse at Warkworth and has since grown to encompass 27 hectares of glasshouses in total.

“Accommodation is also provided, with workers billeted with host families to help foster connections with the community."

While the company solely produces capsicums, it is looking to the future. SPL has a 50% stake in an avocado orchard at Tapora, on the eastern side of Kaipara Harbour.

Under the banner of Harbour Edge Avocados, SPL plans to produce the highest quality avocados for the consumer, Blair says.

The orchard is another outlet for SPL to use their waste products in a sustainable way. Coco peat (a growing media) and compostable strings from the capsicums are mulched and spread around the avocado trees.

The 400-hectare former dairy farm was bought five years ago and the first avocado trees planted shortly afterward, with 150 hectares of the site now planted.

“It’s still early days, and we’re still planting.”

NEXT-GEN ROBOTIC ASPARAGUS HARVESTER UNDER TRIAL

Words by Geoff Lewis, Photographs by Trefor Ward

Mechanical engineering PhD student Matthew Peebles, Snr Lecturer Dr Shen Hin Lim and Waikato University research engineer Josh Barnett

"Matching human labour is a tough job."

That's the comment from Waikato University's mechatronics senior lecturer Dr Shen 'Hin' Lim about the task of building an autonomous machine capable of harvesting asparagus on a commercially viable basis that could ultimately ease mounting labour costs and shortages.

As humans, we have a natural ability to see and recognise things, judge distances and the manual dexterity to select what we want. Developing a machine to do the same isn't easy – but has been the focus of what is believed to be a world-leading mechanical and electronic engineering project intended to create a robotic harvester for the asparagus industry.

Dr Lim says the programme began four years ago at the behest of Horowhenua asparagus grower Geoff Lewis.

About two years ago a prototype robotic asparagus harvester 'V1' was trialled in the asparagus fields of California. The state grows around 40% of United States vegetable produce and faces similar problems to New Zealand when it comes to finding and retaining labour.

Dr Lim describes V1 as a test-bed for basic systems including machine-vision and machine-learning needed to allow what will ultimately be an autonomous robotic harvester to work, at an appropriate speed, up to 20 hours a day in a wide range of conditions.

Near Hamilton in October, the most recent version of the harvester V1.5, was under trail in an asparagus field.

As Dr Lim explains, a robotic harvester must work its way down a row of mature asparagus. These rows are not even and sometimes will be on flat ground, sometimes mounded, and the harvester must be able to select asparagus spears of the correct length from uneven clumps and disregard the rest.

The technology involved can be transferred to other crops and Dr Lim says harvesting rockmelons has been considered

The machine-vision has been a matter of generating a 'point cloud', using a time-of-flight camera.

"The main problem we faced was how to find the asparagus. We wanted to be able to identify the asparagus and its location. The 'vision' is created by using pulsed LED (light-emitting diode) light and measuring 'bounce back' or 'time-of-flight' from which distance can be calculated.

A 'point cloud' is generated and machine-learning is used to process the data to asparagus spears. It is then able to subtract the 'base-plane' – anything it doesn't need to pay attention to – and concentrate on asparagus spears of a predetermined shape and length."

When it comes to harvesting the asparagus, the spears are cut with what looks like a high-tech pair of shears which slide back and forth on a bar as the machine moves forward.

"It's not magic, just a mathematical estimate looking for the best equation to match the available data

At the moment the prototype harvester is tractor-pulled, but the next version, V2, will be fitted with an upgraded camera and harvesting arm. It is planned to be autonomous and either battery or hybrid powered.

Keeping in mind possible Covid-19 hold-ups, the Waikato crew hopes to be back in California by about April next year and aims to try the machine in multiple scenarios including cloudy conditions, rain, and at night.

The technology involved can be transferred to other crops and Dr Lim says harvesting rockmelons has been considered.

The development of the robotic asparagus harvester has been supported with financial input from Callaghan Innovation and internal research funding from Waikato University. Waikato mechanical engineering PhD student Matthew Peebles, university research engineer Josh Barnett, Bay of Plenty-based RoboticsPlus and the Ministry of Business, Innovation & Employment (MBIE) have been associated with its development.

Director of Auckland University's robotics group and vice chairman of the New Zealand Robotics, Automation and Sensing (NZRAS) network, Professor Bruce MacDonald, says the wide variations in crops and conditions are key challenges facing the development of smart technologies used in horticulture, in the field and in processing.

"There is a lot of variation in the product and in the conditions from farm to farm, and products vary in size and quality. Apples, for instance, can be harvested four times in a season and the trees are different, ground and weather conditions are different."

Professor MacDonald says achievements so far include the development of machine-learning technology using cameras to construct a 3D image of the environment.

"Regression analysis is a key factor in learning and training robots. It's not magic, just a mathematical estimate looking for the best equation to match the available data. That's the way we can train a robot to identify and pick apples at the correct colour and maturity."

Professor MacDonald says this technology has been used in the development of a kiwifruit harvester and pollinator with RoboticsPlus.

At the same time augmented-reality headsets are helping to make up for the shortage of skilled labour in harvesting by helping human crop-pickers to make better decisions in orchards.

"There are good opportunities to get robotic devices moving around farms and orchards finding problems, estimating yields, looking for insect infestations."

The robotics industry has gained support from the government through MBIE and a group of 17 industry partners. However, the NZRAS sees an opportunity for national-level collaboration across researchers aimed at making automation technology more available across industries, Professor MacDonald says.

"We would like to bring people together in one centre and encourage more young people into the science. A lot could be done."

Overall Professor MacDonald says the development of robotic technology in agriculture is doing well, and New Zealand is seen as an effective test-bed for technology internationally. ●

Professor Bruce MacDonald is the director of Auckland University's robotics group and the leader for the multidisciplinary CARES (Centre for Automation and Robotic Engineering Science) robotics team. He is the vice-chairman for the New Zealand Robotics, Automation and Sensing (NZRAS) network. For New Zealand's national science challenge Science for Technological Innovation, he is the deputy director, theme leader for Sensors, Robotics and Automation and responsible for capacity development activities. He is co-chair for the IEEE (Institute of Electrical and Electronics Engineers) technical committee on software engineering for robotics.

AUTOMATING THE FUTURE

Supplied by Callaghan Innovation

Callaghan Robotics Plus UGV

Accessible horticulture automation is set to solve local challenges by going global.

What is stopping New Zealand from becoming a world leader in horticultural automation technology?

Answering that question, then building the strategy, connections and services to overcome them is behind a new industry-wide initiative that is bringing growers, researchers and commercialising companies together. The Horticultural Automation Initiative is led by the government's innovation agency Callaghan Innovation.

Now in its early discovery phase, the initiative aims to facilitate better collaboration between New Zealand's researchers, inventors, and commercial operators in horticultural automation and robotics. The goal is to build a strong horticultural automation industry that will become a key economic contributor to New Zealand's Covid-19 recovery by benefiting local growers while addressing global challenges.

In the Agritech Industry Transformation Plan, released in July this year, horticultural automation was identified as one of several key projects with the opportunity to make a significant impact on the industry in a short period of time.

Simon Yarrow, group manager agritech for Callaghan Innovation, says New Zealand already has many of the building blocks in place to build world-leading horticultural automation technology.

"This country already has a strong reputation for the quality of our high-value food products. What is less known internationally is some of the technology that sits behind those products, from breeding, genetics and growing systems to automated systems that support fast, efficient harvesting, sorting, packing, monitoring and transportation.

"The role of the Horticulture Automation Initiative is to work with and support those who already have the expertise and technical capability, and turn it into an industry that benefits local growers and opens up new international markets by solving global problems," Simon explains.

> **"What is stopping New Zealand from becoming a world leader in horticultural automation technology?**

While sustainability and yield security present challenges for growers, the largest problem they face worldwide is a labour shortage – only compounded by the closure of international borders in 2020. This is where increased automation can make a huge impact on growers' efficiency and their bottom line.

There are a number of key players from New Zealand which already have strong global successes in this area. Waikato-based BBC Technologies exports automated packing and sorting machines for small soft fruits such as berries, and is about to build a new R&D centre. Robotics Plus builds automated apple packers and is developing several unmanned ground vehicles for horticultural use. It is also working with Waikato University on an automated asparagus harvester, recently tested by growers in the United States (see story on page 24) Manawatu's GreenTech supplies US growers with seeding and harvesting technologies and is developing a weeding machine.

Simon says the Horticulture Automation Initiative wants to work with the key players such as these, to spread the capability and build a fully functioning agritech automation ecosystem. Some of the local benefits of that would include higher-value jobs (see Table 1 below) and increased export revenue. For New Zealand growers the benefits of greater collaboration should mean better accessibility to technology that is currently often too expensive to be viable.

Table 1

Opportunity for this initiative to create more high-value jobs in the horticulture sector:	
Average salary for a farm worker in New Zealand	NZ $45,565*
Average salary for a person working in the agritech sector in New Zealand	NZ $91,020**

Source:
**https://www.payscale.com/research/NZ/Job=Farm_Worker/Salary.*
***TIN Report – NZ Agritech Insights report 2020*

"Growers are the users, investors, testers and enablers in tech, but often don't want to be – or don't have capacity to be – the commercial owners." On the other hand, he says, researchers need to work with growers and the technology companies to understand the problems they're trying to solve, and how to commercialise the solutions.

"Technology is evolving fast and automation is expensive to develop. There is an opportunity to get a better bang for our local R&D dollars if growers, researchers and commercial hi-tech companies come together. That will be a key function of the Horticulture Automation Initiative."

> **"Researchers need to work with growers and the technology companies to understand the problems they're trying to solve**

Growers are represented in the Initiative by members of Horticulture New Zealand, Zespri, and T & G Global. Wider industry workshops and other forms of engagement are being planned.

The Initiative is still in its early formative stage, with a business case being developed by a core group of growers, researchers and commercialising companies with Callaghan Innovation, but optimism about the initiative's potential impact is high.

"If we can grow and scale capability in agritech then we also fuel greater productivity, solve challenging labour issues, strengthen hi-tech exports whilst giving New Zealand's primary industry a hi-tech productivity boost," Simon Yarrow says.

COCKTAIL TOMATOES: RED IS THE NEW BLACK

Words by Heather Woods

Greg Mundy says they have between 30-35,000 plants growing in total

When you next toss delicious, juicy red cocktail tomatoes into your salad, take a minute to ponder how they got to your benchtop and the rigmarole that growers go through.

Castle Rock Orchard started as a stonefruit orchard covering an entire valley of Christchurch's Port Hills around thirty years ago, and has evolved into a three-site, family operated specialty cocktail tomato operation. It's led by father and son team Peter and Greg Mundy.

Tried and tested works best

They started with a few small greenhouses growing capsicums and tomatoes, before ceasing stonefruit altogether. They understood the risks involved with growing produce in the unpredictable Christchurch weather, and indoor growing meant they had more control.

To increase that control, when it comes to growing their tasty produce they stick with the tried and tested methods they know keep their tidy set-up in stellar working order. Greg says: "We're an NFT grower. All the plants sit in water that flows 24/7 and contains the nutrients and acid to keep pH at the right level." 'Nutrient film technique' has been around since the 1970s and involves growing plants in waterproof channels so they benefit from minerals in the recirculating water. Back then, New Zealand growers quickly adopted the method and Castle Rock was no exception. New growers starting out today probably wouldn't use the method, but if Peter and Greg wanted to change their set-up now it would come at a considerable cost so for now, it's business as usual.

Light, Sun, Action

Despite spring struggling along with cooler than usual temperatures, Greg says the cold weather isn't their biggest issue, it's light. Without adequate light, their 30–35,000 plants wouldn't be as healthy as they are or produce the yields of 20–25 kilos per square metre that they need to achieve. Luckily, their glasshouses allow ample light so they can focus on heat management, particularly during the warmer months.

The ideal temperature for their tomatoes is 20–22 degrees Celsius, and obviously in summer things can get a little toasty. Opening the roof allows hot air to escape, but when a classic nor'wester barrels through Canterbury and humidity drops too low the plants struggle, so the roof is closed again. It can be quite a juggling act. To add another level of complexity, Biobees are shipped in regularly (and the little pollinators escape just as regularly through the roof) and where possible, they're removed come time to start spraying.

The tomato plants at Castle Rock Orchard are grafted and come from really strong rootstock. And depending on the number of plants and their variety, they're mostly picking twice a week for the high quality produce you'll see on the shelves in your local Foodstuffs supermarket. They're one of the biggest tomato growers on the South Island (about mid-level nationally) and thanks to their proximity to the city, labour has never been an issue with plenty of locals up for the task. That's a good position to be in given the current pandemic and travel restrictions in place globally. And in such a specialty field, there's more labour involved across every part of the process – twisting the vines, layering, removing leaves, and of course picking and packing.

Futureproofing on multiple levels

When asked about technology and the future in general, Greg was pretty casual about their planning. He says things are working well the way they are, but they have invested in new auto-grading machinery, technology that helps to automate their packing and frees up team members for more high-touch tasks.

Where they can see room for improvement would be some kind of subsidy or contribution towards carbon credits. Castle Rock uses coal – they don't want to, they would rather use something more beneficial for the environment and less socially awkward – but other options simply aren't available or aren't affordable. Using woodchip requires five to six times more volume and still potentially won't generate enough heat, and it means infrastructure is needed to support it and keep it dry. And then there's waste oil, but supply is really hit and miss – that kind of risk just isn't something they can entertain.

And what stings a little is seeing larger companies, like those in dairy and steel, afforded contracts to burn coal, while they are earning high emissions targets with no choice but to comply. Over time, the cost of everything has increased – the cost of coal, fertiliser, wages – but the retail cost of produce has remained fairly stable. So having high running costs and huge targets can be frustrating and feel like the odds are against you, especially when there are rumours that those large contracts are handed out to avoid lost political votes off the back of potentially huge job losses. It makes you wonder…

But the Castle Rock team are old-school and try to stay out of the politics. They know at some point they'll need to catch up with the times, but for now what they're doing works.

WORK PROJECT MEETING GOALS WITH INDUSTRY-WIDE IMPACT

Words by Kristine Walsh

Providing training, pastoral care and full-time employment for their workforce is good for the entire industry, say Four Seasons managing director Elliot Callender (left) and operations manager Marc Ferris

Though they started with an admittedly modest team of six full-time staff, a Gisborne company is stoked to achieve its aim of increasing that five-fold in just one year, and is excited about building on that even further.

Adding to its core business of packing and exporting squash and citrus, Four Seasons last year established Four Seasons Services with the aim of attracting and retaining staff for both itself and associated growers.

And in October 2019 that ambition received a massive boost courtesy of the Te Ara Mahi arm of the Provincial Growth Fund (PGF), which approved a grant of just over $940,000.

With that grant came line-in-the-sand commitments to establish training and pastoral care, and to up their full-time staff to 31 by November of this year, and to 50 by the time the project finishes at the end of 2021.

"We are well on the way to achieving that but I admit to having been a bit naïve about what that would actually mean," says Four Seasons managing director Elliot Callender.

"The original intent was really just to secure our own workforce, but the shift seen when we move someone from seasonal contracts onto permanent, full-time work is incredible. Acknowledging that they are good workers, that they are part of a team, has led to a leap in engagement and commitment that has been really eye-opening, and there's certainly been a few hugs going on around here."

Having staff move between the packhouse and the field as required means Four Seasons has been able to smooth out the workload, creating those full-time positions in what was previously an extremely seasonal environment.

But without the PGF grant, that could have taken up to a decade to put in place, Elliot says.

"The training and pastoral care does cost, but by the end of the project in November 2021 we anticipate that this model of employment will be sustainable for us. It will enable us to train and retain a sizeable full-time workforce where there are clear employment paths. That is good for us, it is good for the workers, and it is good for the industry as a whole."

The pastoral care enables Four Seasons to nip any issues in the bud, removing barriers to employment and enabling workers to function at their best.

"Of course we have to protect our culture by having the usual employment structures in place, but having a specialised pastoral care person means we can follow up on any issues with a staff member, find out what is going on and how we can help.

"It is expensive but we are passionate about it, how it can help us address those issues of staff retention while supporting people into secure, full-time employment."

And the training element of the project has been key to having not just better workers, but workers who are more engaged.

To achieve that, Four Seasons creates a skills matrix for each individual, who can then see new pathways open up in front of them.

"So as well as in-house training in things like permanent crop maintenance, we work with the Eastern Institute of Technology to help people get horticulture qualifications up to Level 2, to get forklift and wheels, tracks and rollers licences," Elliot says.

> **"Acknowledging that they are good workers, that they are part of a team, has led to a leap in engagement and commitment**

"It's not just about learning new skills. The training shows workers that we value them, we care about them, and hopefully that will encourage them to stick with us."

"If that means we've created an environment where they'll want to stay, that's great. But even if they choose to move out into the wider industry, that is good for regional development which is something we're also really passionate about."

For Four Seasons, meeting its aims in the midst of the Covid-19 pandemic did not come without challenges, but Elliot says timely and targeted support meant they were able to get the job done.

"Because we operate a lot in export we did see a downturn in work, but being an essential business helped us keep going, and access to the wage subsidy gave us confidence to continue putting people into full-time work.

"That, combined with the PGF grant, has been a huge lifeline for us, so it's been amazing to see that level of support for our industry."

Elliot Callender is an engineer by profession, but has since 2006 been general manager of Four Seasons, as well as being a director and shareholder.

"What's most enjoyable for me is how tight our team is, and how we have worked together to achieve some pretty ambitious aims," he says.

"Our pastoral care staff, our administration team and our Four Seasons Services operations manager Marc Ferris have all played a huge part in progressing the training and employment project.

"We believe the goals we are meeting in terms of providing employment opportunities are not just good for us, but also for the region and the industry, and we're really proud of that."

GROWING FOR THE FUTURE

Words by Glenys Christian

A big range of different plants are grown in amongst Brad Harding's vegetable crops including globe artichokes

Every little bit of space is used on vegetable grower Brad Harding's 2.36 hectare block. And through regenerative agriculture practices he plans that will be the case for many years to come.

Brad grew up in the Bay of Plenty and worked for horticultural companies there, as well as in Taranaki and Hawke's Bay, but it was always the goal to work out how he could do it himself. He read extensively on regenerative agriculture and five years ago attended workshops run by Canadian author Jean-Martin Fortier, who has written about small scale market gardening, and Curtis Stone who champions urban farming. Then he and his wife Rachel Yeats put together a crowd-funding proposal, raising $10,000 to lease some land at Te Puna, north of Tauranga, from which they sold vegetables at local farmers' markets then restaurants, before establishing an online store and vege box delivery operation.

Two years ago they and their children, Juno (now 9), Griffin (7) and Fox (5), moved to McLaren Falls Road on the flanks of the Kaimai Ranges to where Six Toed Fox Organics is now based. There were plenty of reasons to enter into a long-term lease on the former kiwifruit block 320 metres above sea level. The relatively flat land was above the spray line, the soil hadn't been turned over for 25 years, there was reliable bore water, there were cryptomeria shelterbelts, and sheds they could repurpose.

They built a greenhouse and nursery and now grow many different salad mixes such as lettuce, baby spinach, rocket, sorrel and kale along with herbs like coriander, fennel and parsley. Large leafy greens include silverbeet, kale, spinach, celery and chard, and rooting vegetable crops beetroot, carrots, turnips, leeks, onions and radishes.

> "Regenerative agriculture as well as reducing harm, seeks to improve the health of the land and waterways and the people who benefit from them

"It was a bit of a stab in the dark growing lots of different things, and there's been a lot of figuring out of what's the most profitable to do."

Rachel put together a farm management database where they can enter all the details for the different crops, along with customer reactions, helpful in reducing wastage. Customers now include Farro Fresh stores as well as Huckleberry Farms. They handle local vege box deliveries themselves, with a courier used for customers further away such as in Taupō.

Extensive use of weed mat means they can harvest one crop then plant another. Around 100 tonnes of commercially produced compost is systematically applied every year, spread mainly on the soil surface. A flail mower is used to mulch the remains of harvested crops 10mm into the soil to get rid of tillage. A diversity of cover crops are grown, with surplus ground in summer being sown in a mix of pumpkins, sunflowers and buckwheat.

"We want a quick maturing crop which doesn't smother others out or set seed too quickly."

They use a mix of fish meal and brown sugar, which once fermented for a minimum of two weeks, produces fish amino acid (FAA) which has no smell. That can then be added into their fertigation system which runs all year round, although it's used more frequently in winter.

Brown sugar is also used with plant material such as docks which are dug out of the ground and valued for the trace minerals they can provide which go back into the soil. The residual vinegar-like liquid is used to dissolve shells and bones to provide extra calcium, which is once again applied back on to the soil. Other useful plants are comfrey and Californian thistle, which is put through a wood chipper before brown sugar is added. Then osmotic pressure will release the sugars good for soil microbes once it is applied. Local fertiliser company Fertco soil tests once a year and supplies a custom blend if required, but often there's little in the way of balance needed.

Pests are dealt with by the introduction of predator insects from Pukekohe firm Bioforce, and a biological pesticide, *bacillus thuringiensis*, deals with white cabbage moth. Any fungi problem, most often on spinach, is dealt with by Agrimm Technologies' biofungicide *Trichoderma*.

EXTENSIVE USE OF WEED MAT MEANS THEY CAN HARVEST ONE CROP THEN PLANT ANOTHER

100 tonnes
of commercially produced compost is systematically applied every year

10mm
A flail mower is used to mulch the remains of harvested crops 10mm into the soil to get rid of tillage

A diversity of cover crops are grown, with surplus ground in summer being sown in a mix of pumpkins, sunflowers and buckwheat

Growing a diversity of crops also helps with a wetter area planted with fruit trees and natives where pumpkins are grown in every second row.

"Healthy plants are much more resistant to attack."

Five staff are employed for most of the year, but that will rise to eight during busy periods. The small-scale market gardening Facebook page has over 1,000 members sharing their accumulated knowledge.

Brad and Rachel began the process to become organically certified four years ago, which is prescriptive when it comes to inputs, while regenerative agriculture as well as reducing harm, seeks to improve the health of the land and waterways and the people who benefit from them. Open days are regularly held on the property and visitors are often amazed at how much produce can come from such a small area.

"It's all about building up the soil," Brad says. "That's key."

CLEAN CO_2 FROM WASTE WOOD

Words by Glenys Christian

Tomato greenhouse at Gourmet Mokai

Trials of a world leading technology have shown that greenhouse growers could soon be able to use a low-cost, renewable source of clean carbon dioxide, meaning a reduction in fossil fuel emissions.

Under the Hot Lime Lab's technology, clean carbon dioxide is sustainably extracted from waste wood to boost levels in the growing environment. Usually commercial growers feed carbon dioxide into their greenhouses to increase crop growth and production by up to 20% if pure CO_2 is used. This means the 400 parts per million (ppm) CO_2 in the atmosphere can reach 600–800ppm, which is a safe environment in which humans can work. But the CO_2, which is vital for plant growth, needs to be clean enough to safely contact plants, which is not the case with most of the emissions from other sources.

Under the technology, which took three years to get to the trial stage, waste wood is chipped and burned to create gas. If it wasn't used it would rot over time and release much of its CO_2 into the atmosphere. During the burning process the gas travels to a carbon dioxide 'sponge' which is composed of thousands of tiny recyclable limestone pellets, called hot lime, which capture and separate the CO_2. This is then released into the greenhouse when air is blown through the pellets. And the heat generated during the process is also available to heat the greenhouse.

Hot Lime Labs' chief executive and founder, Vlatko Materic, says there's a global trend toward greenhouse food production to satisfy the growing consumer demand for greener food with more intensive production methods which are resilient to climate change.

Hot Lime Labs' method of carbon dioxide extraction costs about half that of current forms of clean CO_2 supply, Vlatko says. And they usually require costly and unsustainable fossil fuels, often natural gas, which must be transported to greenhouse sites. Globally, greenhouses are highly efficient and very small percentage yield increases are difficult to attain, with the carbon footprint being quite high.

"Hot Lime Labs' system will increase in crop yields and provide growers with a sustainable source of clean CO_2, reducing fossil fuel usage," he says.

"We really are pursuing our dream to decarbonise the industry."

Vlatko says the system is well suited to the majority of commercial greenhouses, which are near to wood sources such as forestry plantations, a timber mill or wood product manufacturers. And the ability to use other organic feedstocks, including crop waste, is also on the company's development radar.

Trialling of the technology took place in a geothermally heated greenhouse of 4,000 square metres operated by Gourmet Mokai Limited, 27 kilometres north of Taupō at Mokai. New Zealand Gourmet's director protected crops,

WASTE WOOD IS CHIPPED AND BURNED TO CREATE GAS

IN A CARBON DIOXIDE 'SPONGE' MADE OF LIMESTONE PELLETS (HOT LIME), CO_2 IS CAPTURED AND SEPARATED

GAS IS THEN RELEASED INTO THE GREENHOUSE WHEN AIR IS BLOWN THROUGH THE PELLETS

THE HEAT GENERATED DURING THE PROCESS IS ALSO AVAILABLE TO HEAT THE GREENHOUSE

Roelf Schreuder, met Vlatko Materic around 10 years ago and was keen to try out the new system once it was at a prototype stage. He describes the technology as impressive and believes it could bring significant benefits, as it has reduced the company's reliance on long-distance liquid CO_2 deliveries. It also means New Zealand Gourmet can afford to use more CO_2 to boost production at the Mokai site, especially with its LED (light-emitting diode) lights operating.

While heating this particular glasshouse isn't being considered because of the site's access to geothermal energy, he believes this could be attractive to other growers.

"We are excited to have been able to host the first commercial trials of the system and look forward to seeing the positive impact this can make on our growing practices at this and other sites we have in New Zealand," Roelf says.

New Zealand Gourmet set up the Mokai hydroponic growing operation 18 years ago with two Māori trusts. There are now more than 11 hectares of truss tomatoes and capsicums grown under glass, and the company also grows capsicums and strawberries north of Auckland, blueberries in Hawke's Bay and cherries in Central Otago.

TomatoesNZ general manager Helen Barnes believes there will be strong domestic as well as international demand for Hot Lime Labs' system when a commercial model is fully developed, as access to a cost-effective source of CO_2 is a huge benefit to growers.

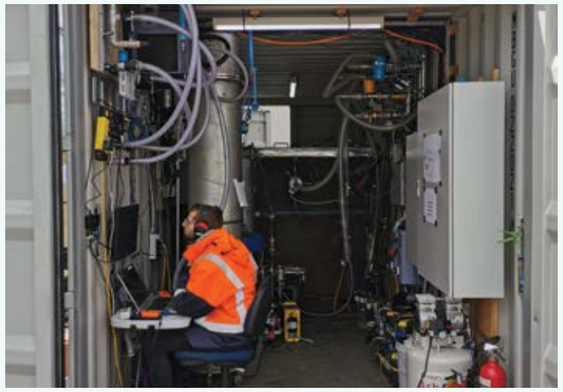
> "We really are pursuing our dream to decarbonise the industry

"It's even better that it comes from a renewable source as this has a positive impact on greenhouse emissions and the rising cost of Emissions Trading Scheme (ETS) levies," she says.

While the government had made a push to steer growers from coal towards biomass heat production a decade ago, the main reason this has not taken off is the massive volume of biomass which would be required. But the Hot Lime Lab's process focuses on CO_2 rather than heat, requiring much less wood, and the technology could provide CO_2 in regions such as the South Island where no alternatives are available. "Growers were really keen right from the start," Helen says.

They could see that they would be able to use resources more efficiently to increase production in a small area, giving a double benefit.

The pilot system



Operating the pilot

Vlatko Materic holding sample of Hot Lime Pellets

FUTURE PROOFING BERRY GROWING

Words by Helena O'Neill

Jay and Linda take a hands on approach to growing their business

Growing berries in a raised hydroponic system under cover is a big investment that makes perfect sense to Jay Molloy.

The 26-year-old is the managing director of Kaipaki Berries near Hamilton, and in October began his first full harvest season.

The farm is a joint venture with MG Marketing and features 75 tunnel houses, each 100 metres long. Fifty tunnels are home to 4.25 hectares of Monterey strawberries in a tabletop system, while the remaining 25 tunnels are planted with 2.15 hectares of Kwanza raspberries.

Jay says the 50/25 split is what worked in terms of labour and profitability. The strawberries offer a constant need for labour, while the raspberries don't have such a consistent labour requirement.

"It is a big investment. You put these structures in place for a long-term goal.

"My father was one of the first in New Zealand to start trialling hydroponic berries. The yield is much better, as we take out some of the most potent elements – rain, hail, and frost."

Starting the business has not been without its challenges.

With water a crucial resource, particularly in a hydroponic operation, it's important to have a quality and reliable system in place. The farm has two water bores high in iron and manganese which is filtered out by a Forsi Innovations filter system. The water is then stored in two large Flexi Tanks, each holding 500,000 litres.

> "Jay is a big believer in encouraging staff to develop their skills and to own their respective areas of expertise

Jay purchased the 16.8 hectare site unseen in November 2018, but did not receive resource consent until May 2019.

"The consent process took a lot longer than we had expected. It was a really stressful time."

Jay and his team spent three months contouring the land and installing drainage. As soon as the resource consent was granted, "we frantically ordered all of our tunnel houses and it was all hands on deck."

By the end of September everything was in place for planting the following month. But the plants had been in storage for three months longer than planned, which had a negative effect on the crop.

"We lost about 50% of our crop. But what we managed to produce was a really nice crop. It ended up being a pretty good outcome, all things considering."

Strawberry prices were hit hard with the arrival of Covid-19, but Jay is optimistic for the future.

Kaipaki Berries employed 40 people at its peak last year, and Jay says they could be up to between 80 and 100 people this year.

"It's our first full season. While I'm not too sure how many people we need, I'm confident in what we bring to the table.

"Last season was a whirlwind. We worked and worked and worked. It's taken about 150% of me to get where we are now, and I'm now trying to get the work-life balance sorted."

Jay met his wife Linda in his teens while working at the Molloy family berry farm. This year they welcomed their first child, daughter Lunarr on 21 June, on the first day of planting.

Linda has a wealth of knowledge about the berry industry and also deals with the HR side of things for the business.

With the management team all aged under 30, Jay is a big believer in encouraging staff to develop their skills and to own their respective areas of expertise.

"We've built a really nice core team. You can't do this on your own at all. It's a very labour-intensive industry and you want to invest accordingly."

Along with his experience growing up on a working berry farm, Jay also draws on his four years of working at Mountford Berries in Tasmania, first as an irrigation monitor then as grower manager. The berry farm started with four hectares of in-ground strawberries and is now a 14-hectare diverse operation of tabletop strawberries, raspberries and blackberries.

Like Mountford Berries, Jay hopes to soon add blackberries to the Kaipaki Berries operation.

Jay's dad Peter, of Tauwhare Berry Farm (formerly Olde Berry Farm), acts as a consultant for Kaipaki Berries.

Peter describes Kaipaki Berries as an innovative and sustainable business model.

"He's doing it well and enjoying it. The remarkable bit is that they coped with Covid-19 well.

Protected cropping "is profitable and sustainable – both ecologically and socially responsible – and much, much more productive. If you look at sustainability going forward, it's brilliant."

The combination of tabletop planting and tunnel houses allows for a much more stable work environment in an industry that is usually "terribly changeable", Peter says.

As for the future, Jay is optimistic and hoping for a great season.

"We're in a really positive place. We've got a really good team and the crop is looking fantastic."

WHAT MAKES A GOOD WORKPLACE ASSESSOR?

Words by Eve Williams : Sector Lead – Marketing, Primary ITO

The workplace assessor is an important part of the training cycle.

They oversee the formal marking process and provide mentoring, either within their own workplace or independently. They are a vital part of maintaining the quality of Primary ITO (Industry Training Organisation) qualifications and programmes.

A workplace assessor is a person such as an experienced supervisor or manager, who works in an organisation that has trainees. They are registered with Primary ITO as a workplace assessor to assess employees in their workplace. The workplace assessment task is performed in addition to their normal duties.

> **A workplace assessor is a person such as an experienced supervisor or manager, who works in an organisation that has trainees**

Because the assessor plays such an important role in the learner experience, there are some processes in place to ensure that learners, employers and assessors are getting a consistent quality of experience.

In addition to being registered as workplace assessors with the Primary ITO, our workplace assessors are expected to have a minimum level of professional assessor training (Unit Standard 4098 for workplace and affiliate assessors, and Unit Standard 30421 for ITO training advisers). The Primary ITO Quality team also regularly reviews the workplace assessors' professional practice, and assessors are expected to participate in ongoing professional development workshops offered by the ITO.

Workplace assessors have a lot of responsibility – they're required to make the final decision regarding a learner's competency, and they have the authority to register the assessment results with Primary ITO, who report those to the NZQA (New Zealand Qualification Authority). After registering results, all workplace assessors have to hold the evidence of their judgement for a minimum period of two years.

Kamarpal Singh explains how to put up a kiwifruit structure as part of a workplace assessment

Assessment and learning are linked

When assessment happens during learning, it is usually informal and known as formative assessment. Formative assessment happens when a supervisor gives a trainee feedback on how they are getting on with a particular aspect of their work.

Summative assessment, on the other hand, is what happens when the supervisor considers that the apprentice is ready to demonstrate knowledge of the different elements of particular tasks – this happens at the end of a particular learning process, and is when a judgement is made that the standards have been met. Summative assessment results tell us whether or not the person has met the standard. Formative assessment helps the learner to reach that standard.

Assessment is an on-going process not a one-off event

When well designed and implemented, assessment provides opportunities for trainees to demonstrate the knowledge and skills required to meet competency standards set out by the ITO. It is therefore not just a 'one-off' event that happens between assessors and trainees. Assessment is the evidence-gathering process carried out by trainees, verifiers, and assessors that supports trainees to achieve what is required for gaining qualifications.

Validity and reliability are strengthened when there are several sources of evidence

Workplace learning frequently involves dividing the roles of teacher or trainer, assessor, and evidence collector between different people. This makes workplace learning different from other institutional educational settings. It can be an assessment strength to have different people in different roles because they can contribute to broader and potentially more valid judgments of achievement than relying on the judgment of one individual.

Diagram demonstrating the triangulation of assessment

Assessors need to be committed to learning and have other important attributes

We require assessors who are committed to the industry and to supporting learners and employers. Workplace-based assessors are often nominated by others for the role and on the basis of their technical expertise. It is important to also consider other attributes such as good communication skills, literacy and numeracy skills, thoroughness, and trustworthiness, because these are essential to being a good assessor. The ability to assess across a range of unit standards requires assessors to have a deep understanding of what they are assessing, as well as the important 'soft skills'.

There are massive benefits for a workplace having its own assessors. It means that:

- The trainee can be assessed without having to stop working or travel somewhere.
- The assessor intimately understands the workplace and often know the trainee.
- The assessment costs are often reduced for the organisation.
- It's easier to adjust assessment practices to suit the workplace situation and the trainee.

So given how important the role of a workplace assessor is, what makes a good workplace assessor?

Integrity

A successful assessor takes pride in their work and is honest and assesses to the principles.

Definiteness of decision

As an assessor, definiteness of decision is important. Assessors must be strong in their decision making, as the alternative of being uncertain undermines authority and erodes your student's confidence and trust in you.

The ability to manage one's time effectively

An assessor needs to plan the process and timing to ensure they have the ability to gather the evidence that may be needed.

A professional demeanour

Understanding the learner's perspective, but maintain the integrity of the assessment methodology, and maintaining trainee confidentiality.

Empathy

A great assessor can step outside themselves and take the time to understand their learners' situations.

Attention to detail

Ensuring the completeness of assessment and that the evidence can be triangulated.

Willingness to assume full responsibility

An assessor must set a good example for their students. Sometimes this involves admitting when they are wrong and being responsible for their decisions and the results.

The ability to be cooperative

Cooperation is essential when it comes to the successful relationship between a student and their assessor.

So you want to be a workplace assessor?

The general rule of thumb is that workplace assessors are people with Primary ITO trainees working in their businesses, and who have at least eight years' industry experience, or hold a New Zealand recognised relevant Horticulture qualification. If you have a potential trainee looking to upskill, and you feel you have the attributes to be a good workplace assessor, get in contact with Primary ITO.

https://www.primaryito.ac.nz/contact-us/

BLUEBERRY COUNTRY HEADS NORTH TO PRODUCE EARLY FRUIT

Words by Wendy Laurenson

Gordon French, Orchard Manager, with new plantings

With two long established blueberry orchards in the Waikato and one in Invercargill, Blueberry Country has recently broadened its growing area to include 32 hectares at Waipu in Northland.

"We're aiming for the early fruit window so we're planting 28 hectares in the ground, a further three hectares in plastic tunnels," says Waipu orchard manager, Gordon French. "We planted 31,000 plants this winter and we'll plant another 39,000 next season giving us some 70,000 plants outside and about 15,000 under cover including some in pots."

Blueberry Country was specific with their Northland site search criteria. "We wanted flat peat land with a water source that was near a main highway for the pick-your-own market, and we found it near Waipu just off State Highway 1 on an ex-dairy farm. The peat here is at least two metres deep and sits over a water aquifer that we've tapped into with a bore. Our existing blueberry orchards give us a model of what works well, so we'll replicate that here on a smaller scale with a few local adaptions."

One of those adaptions is the choice of varieties that will perform well in Northland's low chill winters and produce early season fruit. "We're using a lot of our existing varieties from our own Waikato nursery," Gordon says "but some of these will behave differently in the warmer north so we'll monitor their performance, plus we'll introduce some new varieties and tweak our selections as we go."

Another adaption is using local labour. "I live locally, and the farmer we bought the property from put the word out to his friends and family so we were able to get a planting team of eight starting at the end of Level 4 lockdown. We had cultivated the blocks, then machine laid thin mulch film to keep weeds under control, prevent excess water when it's wet, and retain it when it's dry. We completed the planting in six weeks then spent another two weeks putting finely crushed rock around the planting holes to weigh the plastic down and prevent weeds."

From now until the end of the year Gordon and one other staff member will work four days a week to maintain the new plantings and watch for insect damage. "I'm also fitting out our first shelter structure and adjoining containers for grading, packing, refrigeration, an office and ablutions. The neighbour will graze the unplanted land until the end of the year when the fences will come down and we'll prepare the ground for next year's planting. We expect our first small harvest next year, with a significant harvest the following year. To deter birds, we're trialling bird scarers in the Waikato that play distress calls of sparrow, mynas and starlings, plus hunting calls of hawks, and so far the results are really good."

Most of Blueberry Country's blueberries are sold within New Zealand either fresh, frozen or processed, with a small percentage of production exported

"I'm used to managing people and projects, and I have a lifelong passion for growing things, so I'm enjoying adapting these skills to the blueberry industry and learning a lot in the process

Pick-your-own

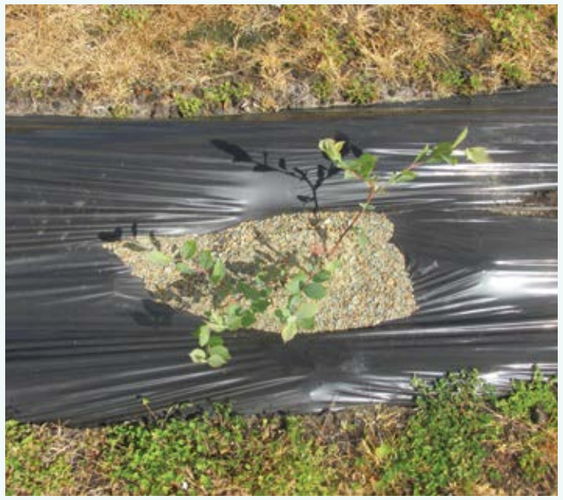
Pick-your-own and direct customer sales are part of the business model of each of the existing Blueberry Country orchards and will also feature at the Waipu orchard. "People love getting out there picking," Gordon says. "Accessible location and good management are the keys to successful pick-your-own, and we enrich the customer experience with an on-site café and the opportunity to buy all things blueberry straight from the orchard."

Most of Blueberry Country's blueberries are sold within New Zealand either fresh, frozen or processed, with a small percentage of production exported. "Greg Furniss, the company's director and owner, is one of the industry's pioneers, planting his first blueberries in 1977 and starting Blueberry Country in 1982," Gordon explains. "Plantings have steadily increased in recent decades, but New Zealand is tiny on the world blueberry scene with massive plantings in Mexico, Peru, Chile, Morocco and the United States. New Zealand still imports 2,000 tonnes of blueberries a year and our Waipu property will yield just 200 tonnes a year, but our aim is to time our production to meet some of the undersupplied winter months."

A big advantage of the north is less likelihood of early or late frosts that can damage flowers or fruit. "We also expect ripening from October onwards because of the warmer temperatures, with our undercover plantings ripening from July or August. Although we'll have some plants in pots, they are not our main emphasis because of their heavy dependence on labour and subsequent higher risk. We plan on using irrigation for our potted and in-ground plants in the tunnels, but not on those in the field."

While Blueberry Country has decades of blueberry experience, Gordon is new to the industry. "I built superyachts for 30 years and came on board here early this year when I was shoulder-tapped out of retirement.

Gordon French, Orchard Manager, in shelter building with container fit-outs under construction



Finely crushed rock weighs down plastic and prevents weeds

BBC Technologies

Gordon's link to Blueberry Country came through a family member working for Blueberry Country Technologies (BBC Technologies) which was founded by Greg Furniss and is now a world leader in packing and sorting blueberries and other small fruit. Gordon adds a few words about the future direction of Blueberry Country: "Greg recently sold the company, and at the blueberry conference in October the 130 attendees visited BBC Technologies' facility at the Hamilton airport industrial complex where over 100 people will be employed."

TECHNICAL

THE LATEST INNOVATIONS AND IMPROVEMENTS

NEW CONTROLS COME INTO FORCE FOR THE HERBICIDE PARAQUAT IN DECEMBER

Words by Rebecca Fisher : Crop Protection Manager, Market Access Solutionz

This article reminds growers that use the herbicide paraquat that new controls come into force next month.

These new controls are as a result of the New Zealand EPA (Environmental Protection Authority) reassessing paraquat last year.

FROM 11 DECEMBER 2020:

Paraquat must only be applied at a maximum rate of **600g of paraquat per hectare per calendar year.** This can be in one or several applications, such as 200g of paraquat per hectare applied three times in a year, but the total amount applied in any year must **not exceed 600g.**

Only **coarse or larger droplet sizes** can be used.

The following **buffer zones** must be followed:

APPLICATION METHOD	MAX RATE G AI/HA *	
	<400	400 - 600
Ground	0 metres	5 metres
Aerial	5 metres	15 metres

*(*grams of active ingredient per hectare)*

No buffer zone applies to ground-based application if it is done using non-motorised hand-held equipment.

Unlike some reassessments, the EPA has not restricted which crops paraquat is allowed to be used on (i.e. it can still be used off label as long as all the above controls are adhered to). There is a restriction limiting the use of paraquat to horticulture only (i.e. not forestry or ornamental horticulture in publicly accessible places such as public gardens).

The controls take effect from 11 December 2020, but manufacturers have an extra year after this to change the product label. This means that there will be a period until December 2021 when these controls must be followed but they may not be reflected on the product label. Growers therefore must be aware of this.

> **“ The controls take effect from 11 December 2020, but manufacturers have an extra year after this to change the product label**

If you would like further clarification or guidance on these changing controls, please contact your Product Group manager.

The EPA's decision on paraquat can be found on its website: **https://www.epa.govt.nz/public-consultations/decided/reassessment-of-paraquat/**

MICRONUTRIENTS AND SOIL CONTAMINANTS

opinion

By Robin Boom : CPAg, Member of the Institute of Professional Soil Scientists

Plants need at least 16 elements to grow and these can be categorised into major elements and micronutrients.

The major elements are carbon, oxygen, hydrogen, nitrogen, phosphorus and potassium). Most of the carbon, hydrogen and oxygen comes from the air, and nitrogen, phosphorus and potassium come from the soil. There are also other major elements – sulphur, calcium and magnesium – which plants need to grow. Then there are the essential trace elements or micronutrients – boron, iron, manganese, copper, zinc, and molybdenum. Iron, manganese and copper are all involved in various processes related to photosynthesis. Iron, copper, manganese and zinc are involved with various enzyme systems in plants. Zinc in particular is needed for the production of auxins which are plant growth hormones affecting leaf and shoot elongation. Boron is the only micronutrient not involved with photosynthesis and enzyme function, but is critical for the production of sugars and other carbohydrates in plants as well as the reproduction system. Molybdenum is mainly needed for enzymatic nitrogen assimilation in plants.

5.8 – 6.3

THE SWEET SPOT FOR PH FOR MOST PLANTS FOR PHOSPHORUS AND TRACE ELEMENT AVAILABILITY SITS IN THE 5.8 TO 6.3 RANGE

There are many soil related complexes which determine the availability of elements, and because a soil test may show adequate levels of a particular element does not necessarily mean that the plant will be able to adequately absorb it. Soil pH (acidity/alkalinity) for example has a bearing on the availability of many elements, with molybdenum becoming more available as the pH lifts, whereas the metallic elements iron, manganese, copper, zinc, and also boron become less available for plant uptake as the pH rises. Phosphorus uptake is also affected by the soil pH as it is not as readily bound up by iron and aluminium complexes as the pH lifts, but having too high pH can cause it to be bound up by excessive calcium.

This is why the sweet spot for pH for most plants for phosphorus and trace element availability sits in the 5.8 to 6.3 range. A higher pH also favours soil microbial activity and earthworm numbers and better facilitates nitrogen fixation by leguminous plants and other nutrient cycling in the root zone. There are also other factors affecting the availability of micronutrients such as the organic matter content and excesses of competing elements.

Under intensive horticulture it is common to find excessive amounts of phosphorus and potassium build-up in the soil which can impact on the availability of micronutrients. High phosphorus for instance can impede the uptake of iron, copper and zinc, while excess potassium can impact on the availability of copper, calcium and magnesium. Excess nitrogen can reduce the availability of calcium, magnesium, copper and boron and can also affect the storage ability of many fruit and vegetables because of excessive nitrate levels. Excess nitrogen and phosphorus are also recognised environmental contaminants, and it makes little sense over-fertilising crops for economic, environmental and productive reasons. Mounting pressure to clean up the environment by reducing unnecessary inputs can improve crop yields when these are being affected by micronutrient deficiencies, and it can improve crop quality.

There are also some fertiliser contaminants, namely fluoride and cadmium, which have built up on high fertility areas. All sources of naturally occurring phosphate rock contain fluoride, and in the manufacture of superphosphates much of this fluoride remains. On pastoral farms, what is commonly referred to as phosphate poisoning where animals die after ingesting fertiliser from recently fertilised pastures, is actually fluoride poisoning caused by fluorosis of the liver. There is also some overseas research showing phytotoxicity in plants to excess fluoride build-up in the soil. Imported high analysis fertilisers and compound fertilisers tend to have a lot lower fluoride levels than locally manufactured superphosphate.

The other noted contaminant in phosphatic fertilisers is cadmium, which is a heavy metal that builds up in the soil. Properties which received high amounts of Nauru or Christmas Island superphosphate before the 1990s may have high cadmium levels. The fertiliser industry has now set its own standard of not selling fertilisers which contain over 280 ppm of cadmium per kilogram of phosphorus.

> **It all comes down to having the correct balance of nutrients in the soil, a kind of Goldilocks zone where there is not too much nor too little, but the levels are just right – agronomically, environmentally and financially**

Most high analysis and compound fertilisers contain low levels of cadmium. Being a heavy metal, cadmium tends to accumulate in certain body organs such as the liver, kidneys and brain. Most of our soils have below 0.5 ppm of cadmium naturally, but if levels have climbed above 1 ppm, fertilisers containing cadmium should be avoided so it does not get into the human food chain. Currently the liver and kidneys from older cattle and sheep in New Zealand are no longer sold for human consumption because of the risk of high cadmium levels. For horticultural crops, discontinuing indiscriminate fertilising with phosphatic fertilisers when soil phosphorus levels are already high will help circumvent any potential barrier to selling produce to the general public and for overseas export due to potential cadmium concerns.

Two other heavy metal contaminants which are also micronutrients are zinc and copper, which both have fungicidal properties. When I was consulting in the United Kingdom 20 years ago I tested some hop growing ground and was surprised to see extremely high copper levels in the soil from decades of copper oxychloride and other copper containing fungicides. Excessive copper can have a detrimental affect on the availability of other elements such as iron, zinc, manganese and phosphorus, as well as affecting soil microbial communities and earthworms. In recent years I have noted a big spike in soil copper levels on some kiwifruit orchards from the use of copper sprays to counter Psa and should this continue it may become cause for concern. Some long established fruit tree orchards which have been sprayed for decades with copper sprays have excessively high copper levels.

Zinc levels can be high in some pig manure and bio-solid materials, and the continued use of zinc oxides and sulphates given to animals in the North Island to help mitigate against the effects of facial eczema over the past forty years has raised zinc levels on some farms several times higher than the natural background zinc levels. All of these heavy metals become less available when the soil pH is kept up, and when there are good phosphorus and organic matter levels, the plant availability of these elements is reduced. It all comes down to having the correct balance of nutrients in the soil, a kind of Goldilocks zone where there is not too much nor too little, but the levels are just right – agronomically, environmentally and financially.

LA NIÑA
INTENSIFIES RAPIDLY

Words by Georgina Griffiths : MetService Meteorologist

La Niña conditions have recently intensified in the tropical Pacific Ocean, with a better-than-even chance that this event becomes a strong (major) La Niña event between now and Christmas.

Forecast models were initially reasonably cautious with respect to the intensity of this event, originally favouring a 'moderate' intensity scenario, but at the current time of writing (19 October), half of all climate models now predict an event that exceeds the 'strong' threshold by the end of 2020. In part, this shift in the predictions reflects the rapid intensification in La Niña conditions seen in the first six weeks of spring.

Recent factors for New Zealand:

As expected, the first half of spring 2020 (the period from 1 September – 15 October) was characterised by two things:

- **Intense highs**, most often centred over the Tasman Sea and extending a ridge of high pressure onto the North Island, produced drier than normal early spring conditions in most North Island areas, with westerlies frequent across the South Island (Figure 1).
- **Unusual temperature volatility**, including some unusually late in the season low snowfalls, and some abnormally late frosts.

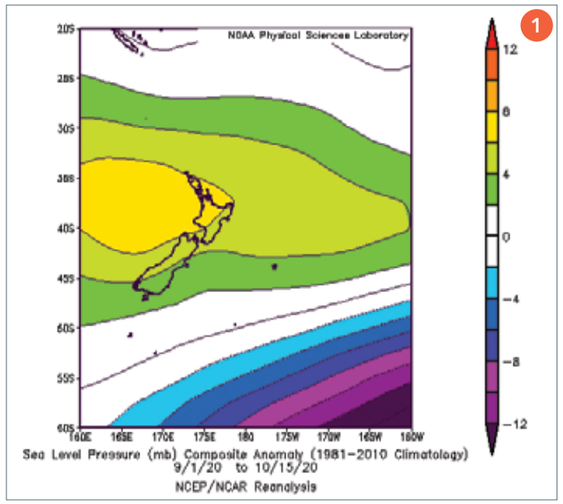
The early spring dryness can be observed in Figures 2–5. At the time of writing, year-to-date rainfall accumulation at Gisborne was sitting at 85% of normal, with Napier sitting at an extremely low 59% of year-to-date normal. Palmerston North had clocked up around 82% of normal year-to-date rainfall, while Nelson was sitting at 66% year-to-date normal.

La Niña – what does it mean longer term for us?

La Niña conditions are forecast to peak in intensity around Christmas time, and then persist through into early autumn 2021.

La Niña becomes an important driver for New Zealand over longer durations (for example, across two to six months), especially when the event is a strong one.

Although every La Niña event is different, you can plan for certain types of weather patterns to play out more frequently than usual.



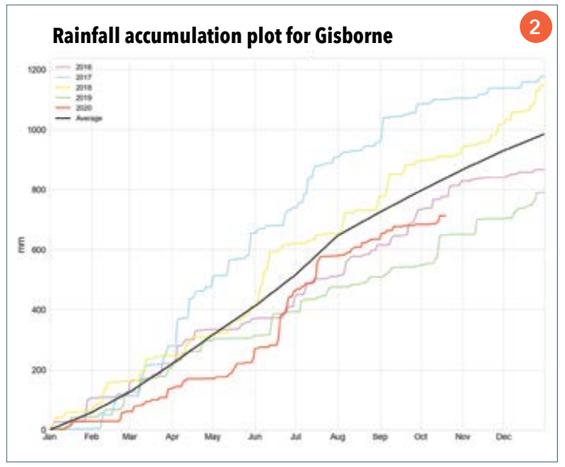
The independent long-range European Centre for Medium-Range Weather Forecasts (ECMWF) multi-month pressure, rainfall and temperature predictions that MetService operate over the three-month to six-month window all indicate a fairly typical La Niña summer (December to February) weather pattern overall.*

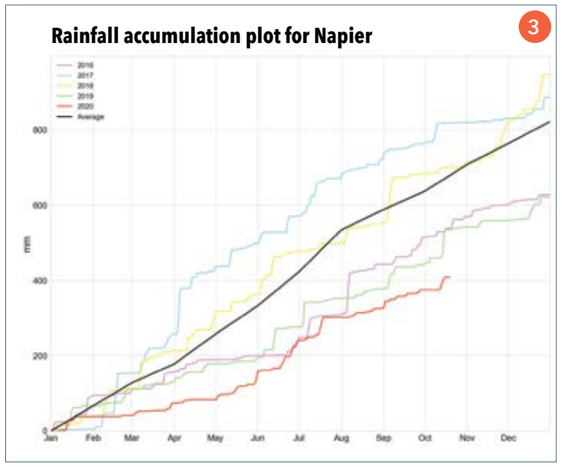
*Of course, day to day, and week to week, Mother Nature will throw the usual wide variety of weather maps at New Zealand – you will still have to watch the weather map and the MetService weather forecast. However, when you 'zoom out' at the end of a season, there is every expectation that the weather maps that have shown up *most* will be La Niña-like.

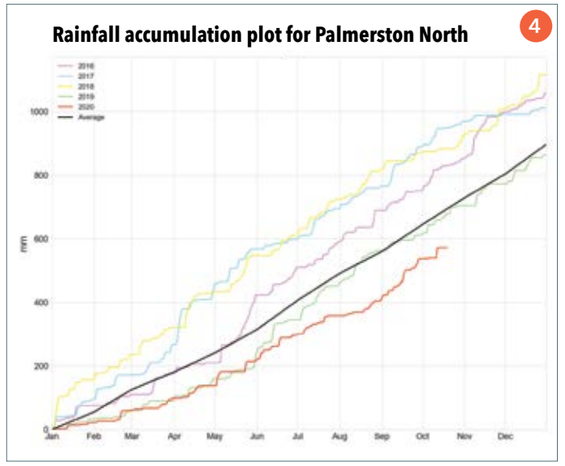
From a planning point of view, one should work on the principal of more frequent Highs than usual across the South Island, with a clear signal for drier-than-normal conditions in western and inland regions of the South Island.

Similarly, an 'active tropics' to the north of New Zealand is indicated, with frequent easterly winds across the upper North Island, and an increased risk of a wetter than normal summer over the far north of New Zealand (Northland, potentially Auckland, Coromandel, parts of the Bay of Plenty, Gisborne, and sometimes Hawke's Bay).

As always, keep up to date at with our latest thinking via the MetService long-range commentary at **http://metservice.com/rural/monthly-outlook**.







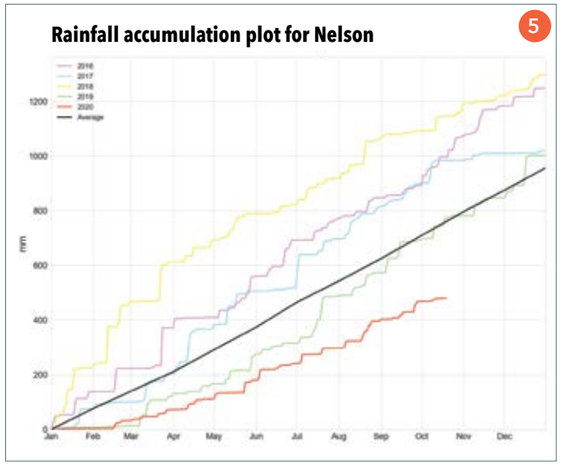


***Figure 1**: Mean sea level pressure anomaly (deviation from normal) for the first half of spring 2020 (i.e. for the period 1 September to 15 October 2020). Yellow colours indicate higher than usual pressures; purple and blue colours show lower than usual pressures.*

In this image, higher than usual pressures (yellow colour) are observed over the Tasman Sea, with a ridge of high pressure extending onto the North Island. Similar to a weather map, the black lines can be viewed as anomalous 'isobars', indicating more westerlies than normal observed across the South Island. Map produced courtesy of National Oceanic and Atmospheric Administration (NOAA)/Earth System Research Laboratories (ESRL) Physical Sciences Division.

***Figure 2**: Gisborne annual rainfall accumulation (mm) for the last five years (2016 to 2020). The annual average rainfall accumulation is shown in black.*

***Figure 3**: Napier annual rainfall accumulation (mm) for the last five years (2016 to 2020). The annual average rainfall accumulation is shown in black.*

***Figure 4**: Palmerston North annual rainfall accumulation (mm) for the last five years (2016 to 2020). The annual average rainfall accumulation is shown in black.*

***Figure 5**: Nelson annual rainfall accumulation (mm) for the last five years (2016 to 2020). The annual average rainfall accumulation is shown in black.*

HUMIDITY CONTROL

Words by Elly Nederhoff : Crophouse Ltd

Greenhouse climate control with a dedicated computer seems easy: the grower choses the desired levels or set points, and the computer steers the heating, venting, fans, screens, and so on.

But it is not easy to choose settings that are both good for crop production and energy-efficient. Temperature and humidity settings combined govern the heating and venting, and these two factors can be at odds. It is important to realise that *every degree higher temperature* or *percent lower humidity* in the set points costs energy (we are talking winter conditions). Note that there are various ways to describe humidity, including absolute and relative humidity, VD, VPD (vapour pressure deficit) and dewpoint. In this article we use relative humidity (RH), because everyone is familiar with it, and it works well enough for our purposes. Other units such as dewpoint and VPD can be technically better, but are a bit complicated.

Greenhouse air humidity

Air humidity in a greenhouse is a dynamic balance. The base is the amount of water vapour in the outside air. On top of that comes water vapour added by plant transpiration. Subtracted from it, is water vapour disappearing due to ventilation and condensation. Humidity control is aimed at avoiding extremes: in winter avoiding high humidity that would cause fungal diseases, in summer avoiding low humidity that would cause plant stress. From an energy perspective, we are interested in winter conditions only. In a planted heated greenhouse in cold conditions, the absolute and relative humidity are much higher inside than outside. Therefore venting, which is air exchange with outside air, has a dehumidifying effect. But venting is also loss of energy (warmth and water vapour), so heating is needed to maintain the required temperature. A bit of venting is necessary for avoiding high humidity in winter, but excessive venting is waste of energy.

> “Every degree higher temperature or percent lower humidity in the set points costs energy

Humidity and fungal diseases

When choosing the setpoints for air humidity in the winter, most growers set the RH at a safe low level to reduce the risk of fungal diseases. This prompts simultaneous heating and venting, which costs a lot of energy: every percent lower RH costs more money. The first way to save energy is by choosing a setpoint not too low. As disease prevention remains paramount, the question is, what RH setpoint is safe in winter?

First some background. Spores of fungal diseases such as grey mould (*Botrytis*) often hang around in a greenhouse waiting for the right conditions. The right condition is a thin layer of water on a plant part (leaf, stem, flower or fruit) to let the fungal spores germinate. If the plant part remains wet for some hours, the hyphen from the germinated spores can penetrate the plant. Once inside the plant, the fungus is not depending on air humidity anymore. Thus, fungal diseases can be prevented by drying the plants in time, to give spores not enough time to infect a plant.

> Cold spots are the first to get wet from condensation, and this is where diseases start

Condensation

Plant wetness can be for various reasons: spraying, fogging, condensation. Spraying must be done when the plants have a chance to dry. Condensation occurs when the RH is very high and there is a cold surface with a temperature below the dewpoint. This can be a cold glass roof or cold plant part. Leaves can be cold, but particularly solid parts such as fruit can be cold early in the morning. This is when the heating system or the sun warms up the plants, but the fruit with their bigger mass take longer to warm up. As fruit lag behind in temperature they get below the dewpoint and become wet from condensation.

Cold spots

Nearly all greenhouses have cold spots, be it a corner with inadequate heating or broken windows, or spots deeper in the plants that get little sunshine and air movement. These places are the first to get wet from condensation, and this is where diseases start. A series of temperature measurements can show if the temperature is uniform or if there are serious temperature differences. Temperature uniformity can be established by improving the heating lay-out, repairing broken glass, increasing air movement, or opening dense foliage. This will reduce the risks of condensation and thus diseases.

The next step is avoiding too high air humidity. If a greenhouse has no cold spots at all, the RH setpoint can be set high, in theory close to 100% (but that is unrealistic). In contrast, if there are large temperature differences, the grower must maintain a safety margin and keep the RH under 85% or 80% or even lower. Such a low setpoint means that a lot of energy is used for heating combined with venting. Therefore, identifying and resolving cold spots will significantly improve energy efficiency while keeping diseases in check.

Other effects of humidity

Humidity control in winter is important for maintaining plant health, but also for influencing transpiration, which takes care of nutrient uptake and transport. Humidity also affects for instance pollination in fruit crops, leaf stretching, plant shape and the general vulnerability of the plants. Humidity control can be improved by using more refined measurements. More on humidity and its control in a following article.

WISE LAND MANAGEMENT
A WIN-WIN

By Kristine Walsh

Connecting science and farming – researchers and growers cooperating in a field trial

Dan Bloomer has great faith in growers' desire to do the right thing in terms of nutrient management, and works hard to help them do it.

"Over the course of my working life I've come to the conclusion that if I want farmers to be environmentally better, I have to show they'll be economically better off, too," he says.

"To me, it doesn't matter whether they want to save a bit of money while happening to do the right thing environmentally, or whether their focus is on sustainability with a bonus at their bottom line. The result is the same."

Founder of both Page Bloomer Associates consultancy and the farmer-driven LandWISE society to promote sustainable cropping, Dan's work encourages environmentally sound land practices through projects like LandWISE's Future Proofing Vegetable Production (FPVP), where it has partnered with growers and funders to develop and test nitrogen application and mitigation.

"Horizons Regional Council was right behind us in putting together a research and extension programme which we have with funding from them, the Ministry for Primary Industries, Ballance AgriNutrients, Gisborne District Council and Potatoes NZ, along with the support of growers."

Working with growers in Horowhenua and Gisborne, the three-year LandWISE trial focuses on four key areas:

1. working out how much nutrient is required;
2. ensuring the right amount is being applied;
3. ensuring leaching is minimised;
4. and recapturing nitrates that do move beyond the root zone by constructing wetlands and wood-chip bioreactors.

"Growers can feel overwhelmed by the avalanche of regulations and consumer demands, so we want knowledge of best practice to be as accessible and usable as possible," Dan says.

"Growers needed nutrient budgets but there wasn't a suitable template so we made one. It's a one-pager that pulls together their soil test information, expected yields, the *Nutrient Management for Vegetable Crops* book information and their fertiliser options.

"At the end of the season, they can repeat the process using actual yield and fertiliser and see how close the inputs and outputs matched. And now we're working on an app so they can do it on their phones.

"Similarly, calibrating a fertiliser applicator is simple once you know how, so we made the LandWISE calculator (**www.fertspread.nz**) to do the maths and print off a report."

The only times he's seen resistance, he adds, is when a grower has thought it was all going to be too hard.

"But we've found that if we offer good information in a form that makes sense, and if we take time to understand and answer their questions, they're very quick to adopt great practice."

In Horowhenua, LandWISE agronomist Luke Posthuma has worked with growers producing leafy greens or potatoes, while in the second trial area, Gisborne, process crops like sweetcorn and tomatoes have been more of a focus.

Last year Gisborne had a really dry winter, so without rain washing out the nitrate, levels were higher than usual so much less fertiliser was required. Luke saw that in his data, so this season he's working with growers to trial use of nitrate Quick Test strips to determine nitrogen requirements at side-dressing.

"It's about responding to actual need, rather than just doing what has always been done, and in both Gisborne and Horowhenua we've been working with some great growers, corporate and otherwise, who are really interested in this kind of work, so that's fantastic," says Luke.

It is very hard to measure nitrate losses and modelling tools are not strong for vegetable crops, and Dan doesn't see that changing any time soon.

"But it is easy enough to consider on your farm and that is how the nutrient balance sheet can help," he says. "If you are putting X kilos of nitrogen on a crop, and you sell produce containing Y kilos, then where did the rest of it go? If a fertiliser budget is out by hundreds of kilograms, then you need to do things differently."

Through the FPVP project LandWISE recommends a toolkit made up of "cheap as" nitrate soil testing strips, lab tests where necessary, knowledge about good practice and the super easy nutrient sheet to help growers balance their nutrient budget.

And it is that, plus other handy information, that they hope to take on tour once FPVP comes to an end in June next year.

"We have all these lessons, we know how to effectively engage and share information and that – perhaps with some more regionally-specific demonstration trials – is what we'd really like to roll out around the country," Dan says.

"There is agreement that it is necessary so it's just a matter of getting the funding in place, and we're really keen to see that happen.

"Workshops and demo days are great, but it's when you actually sit on a farm and engage that real change happens, and to me that's the whole point."

But even farmers not involved with the FPVP project don't have to wait to get on board.

"Any farmer can access our website, download the budget sheet, access the fertspread calibration site and so on. Some growers will learn that they need a little bit more fertiliser, but many will find they can use less, and that's potentially thousands of dollars that's not just washing away into the environment."

The best thing about the Future Proofing project, says Dan Bloomer, is that it has been embraced by "even the most unlikely-looking blokes."

"In general, I think everyone is on board with change as long as they are in control," he says. "Tools and projects like ours are a way of handing them that control so they can grow better crops for less cost, and help the environment while they're at it."

FUTURE-PROOFING STRAWBERRIES

Plant & Food Research
Rangahau Ahumāra Kai

Words by Mette Nielsen : Scientist, Plant & Food Research

The AGMARDT fellow Dr Paul Horne from IPM Technologies in Australia presenting to NZ strawberry growers and wider industry at the field day in January 2020

In July, the first year of research was concluded in the Sustainable Farming Fund (SFF) project 'Future-proofing thrips management in strawberries' (SFF405943).

Our aim is to increase knowledge and develop and implement new tools and management techniques to manage thrips in strawberry production in New Zealand, transforming the current Integrated Pest Management (IPM) strategy.

Past practices to manage thrips are currently heavily reliant on non-selective insecticides, but control failures and the unsustainability of this practice mean it is not an option for future production. It is also a barrier to the successful implementation of currently industry-developed IPM strategies for pest management. The knowledge generated in this project will enable growers to minimise economic damage of pest thrips and enable an overall IPM strategy to be implemented across New Zealand strawberry production. The project is a collaboration between the New Zealand Institute for Plant & Food Research Limited and Berryworld Limited.

In the first year, we conducted a grower survey, field trials, a growth room pot trial, and a literature review on thrips pest species and management options in strawberry crops.

The team was also active with end-user engagement activities, and obtained additional funding from AGMARDT (The Agricultural & Marketing Research & Development Trust), enabling the involvement of overseas IPM expert Dr Paul Horne.

Four field trials were conducted from October 2019 to April 2020 at strawberry growers in Auckland, Hawke's Bay and Canterbury, covering different growing systems. We used blue sticky traps and visual observations in the strawberry crop and surrounding vegetation to determine which thrips species were present. This was unknown at the start of the project and is critical information to develop pest management strategies. We also determined thrips phenology (when insect life stages occur) and presence of their natural enemies.

The species of thrips in strawberry crops varied among growers, and there were large differences in seasonality and pest pressure. The main thrips species caught in the strawberry crops were intonsa flower thrips (*Frankliniella intonsa*), western flower thrips (*Frankliniella occidentalis*), onion thrips (*Thrips tabaci*) and New Zealand flower thrips (*Thrips obscuratus*); however, their dominance, pressure and peak times varied depending on the growing system and location.

A growth room pot trial explored the actual damage potential of three of the main thrips species on strawberry fruit. The results showed that the damage potential of intonsa flower thrips on strawberry fruit is severe. Western flower thrips also damaged the fruit, whereas the damage potential of onion thrips is still questionable. Unfortunately because of difficulties rearing New Zealand flower thrips, this species was not tested, and to date its damage potential is unknown.

> **"The species of thrips in strawberry crops varied among growers, and there were large differences in seasonality and pest pressure**

Based on the knowledge gained in year 1, the team concludes that a 'one-size-fits-all' thrips IPM strategy for New Zealand strawberry crops is not an option. Going forward, the big differences seen among growers, regions and growing systems will need to be carefully considered to ensure benefits of the move towards IPM strategies to the industry.

Based on the first year's results, discussions at our project team meeting last September, and further liaison with the industry and growers, the following activities are planned for the coming 2020–21 season:

- One on-farm demonstration trial using reduced input pest management (e.g. biological control agents, soft chemistries).
- Three training workshops for growers, scouts and agronomists to gain knowledge and confidence around identification of thrips and other pest species for proactive management.
- Testing the efficacy of selected biological control agents for intonsa flower thrips.

This proposed work will provide:

- Scientifically validated data from a split strawberry block with grower practice on one side and reduced input with biological control agents on the other side.
- Data on the efficacy of using biological control and IPM-compatible insecticides to manage thrips and other key arthropod pest species.
- Knowledge and training that will enable better monitoring by the wider industry, for more timely and reduced input management strategies for thrips and other pests.
- Understanding of the efficacy of existing biological control agents on the main fruit-damaging thrips species found in strawberry crops in year 1.

These are critical steps towards more sustainable thrips management programmes for New Zealand strawberry growers, and will help to build confidence in the use of reduced input management strategies that do not rely solely on synthetic insecticides.

Examples of blue sticky trap, collected strawberry flowers and beat tray sampling used for season long field monitoring of thrips and natural enemies

Strawberry plant with thrips bagged onto flowers to assess the damage potential of the different thrips species

GREENHOUSE CUCURBITS

final word

By Mike Nichols

Figure 1: *Greenhouse melon crop*

Figure 2: *Grafted watermelon seedling*

Figure 3: *Seedless watermelon*

On 13 December 2019 the New Zealand Ministry for Primary Industries (MPI) advised the Queensland government of the suspension of imports of fresh cucurbits from Queensland due to the presence of cucumber green mottled mosaic virus in a consignment of watermelons.

At the current time this suspension still applies, and the price of cucurbits in New Zealand is of course considerably higher than normal because it is not possible to import the cheaper field grown produce and therefore the only product available in New Zealand must be grown under protective cultivation.

Of course most of the cucumbers consumed in New Zealand are greenhouse grown in New Zealand, and have been for many years, and it is only the out of season zucchini, watermelon and rock melon which are normally imported. This is not to say that these crops cannot be grown in greenhouses in New Zealand, and in fact some 40 years ago there was considerable interest in the potential of producing rock melons as an export crop for the Japanese market.

Of course in this respect New Zealand has one big advantage over Australia in that we are free from fruit fly and can export to Japan. At Massey University we grew a number of melon crops at that time both outside and in a high tunnel house and in heated greenhouses. More recently I grew seedless watermelons hydroponically in a heated greenhouse.

I have also seen crops of courgettes being produced here in greenhouses near Tauranga, growing up strings, and clearly out of season. I suspect this is a much more difficult crop to manage then melons or watermelons. The leaves are much larger and brittle, and they really do not lend themselves to greenhouse production. The key to successful courgette production is regular harvesting, and the control of mildew.

How does one grow a cantaloupe in a greenhouse? It certainly requires a considerable amount of training of the plants, but the basic philosophy is to grow them up a string to a height of about two metres, and to remove all the laterals and flowers up to the 9th or 10th leaves. Cantaloupes produce separate male and female flowers and the male flowers develop mainly on the main stem and the female flowers on the lateral shoots. If the lateral shoots are only allowed to develop above the 9th or 10th main leaf, this is where the fruit will be formed. Therefore, everything produced in the axiles of the leaves up to that level are removed, lateral shoots and any male flowers and because there are plenty of male flowers produced further up the main stem at the time when the female flowers are open. The laterals are stopped after two leaves, and because the fruit behaves as a very strong 'sink' vegetative growth on the plant virtually ceases after pollination. The number of fruit allowed to mature per plant can then be decided, and any surplus removed.

My first attempt to pollinate the flowers with a small artist's brush was a complete disaster – it became covered in nectar; so I reverted to using bumble bees, which did an excellent job. If the melons are then bagged into small nets, they can be harvested at optimum maturity for the particular market. Full slip for local market and slightly less mature for more distant markets. ('Full slip' means a gentle nudge with your thumb on the melon where it joins the stem will dislodge the fruit.)

There are essentially two types of watermelon available, the standard seedy watermelon, of which the variety 'sugar baby' is an excellent example, and the seedless type, which requires very special treatment if it is to be grown successfully. Seedless watermelon is always priced higher because it is much more difficult to grow. Of course, how well it sells depends on whether the consumer minds swallowing the almost non-existent seeds of the 'seedless' variety or prefers to spit out the black seeds from the conventional watermelon.

Watermelons are prone to some serious root-borne diseases, and in many countries they are grafted onto a disease resistant Laganeria rootstock (see photo).

Seedless watermelons also require higher temperatures than standard varieties to germinate and grow. They also require a pollinator because they are triploid (produced by crossing a tetraploid with a diploid plant), and are therefore self-sterile. This means that about one in five of the plantings will need to be of a pollinator, which will have little or no economic value, however once the pollination has occurred then the pollinator can be removed to allow the triploid to fill the ground more effectively. Obviously using hydroponics is more likely to produce a superior crop than growing in soil, and coir might provide the most suitable medium. I consider growing watermelons up strings to be unworkable, and allowing them to spread over the floor of the greenhouse the simplest training solution.

> **"Using hydroponics is more likely to produce a superior crop than growing in soil**

Pests such as spider mite can be a potential problem for cucurbits, but useful biological control methods (such as using *Phytoseiulus* for spider mites), can reduce the need for any spraying.

Harvesting is the next problem, and this requires experience to ensure that the watermelon is mature, but not overmature. The drying of the tendril closest to the melon, the colour of the ground spot, and the sound of the melon when tapped are all useful means of knowing when to harvest.

PRODUCT GROUPS

ALL THE LATEST NEWS FROM YOUR PRODUCT GROUPS

Process Vegetables NZ

A SNEAK PEAK AT PROCESS VEGETABLE BIOLOGICAL CONTROL OPTIONS USING *TRICHODERMA* BIO-INOCULANTS

Words by Leanne Stewart : General Manager, Process Vegetables New Zealand

In early October the Process Vegetables Board were hosted by the Bio-Protection Research Centre at Lincoln University to learn more about research being undertaken in the field of biological control of soil-borne and seed-borne diseases of vegetable crops.

One of the topics the Board were interested in learning about was the application of *Trichoderma* biological control agents.

Trichoderma is a genus of fungi that is present in soils, with certain species and isolates acting as antiviral plant symbionts. It is this characteristic that has made them the focus of research for potential biological control agents. Once a *Trichoderma* species or isolate's beneficial mode of action is identified, work can be done to determine how efficient the target fungus is at colonising the rhizosphere of host plants and their endophytic activity. The development of a culturable biological control agent is the desired end result.

There are thought to be multiple benefits from using *Trichoderma*, including the ability to combat pathogens present in the soil, and promote seedling establishment and plant growth (including both root and foliar) by improving access to available nutrients. This builds the plant's immunity by making it more resilient to attack and environmental stressors, resulting in increased yield.

The use of *Trichoderma* is also beneficial to the surrounding environment. Once commercialised, it is able to be applied as a biological control agent in integrated pest management (IPM) programmes. Its use often complements other crop practices growers use, reducing inputs such as synthetic agrichemicals that can disrupt the delicate production ecosystem. It is worth noting though that unlike agrichemicals, biological control agents are not designed to directly kill pathogens like fungicides, instead they use mechanisms of antagonism, parasitism, induction of host-plant resistance, and competition.

Trichoderma products are readily available for use across a range of crops and are commonly applied by seed treatment, inoculation at the nursery stage, fertigation and dusting of plants. If you are interested in trying *Trichoderma*, we recommend you speak to your local crop advisor for direction on the products available for use on your crops.

SMART TRACKING AND TRACING: PILOTING OUR BIOSECURITY EMISSION LEVY INFORMATION SYSTEM (BELIS)

Words by Gemma Carroll : Communication & Engagement Office, Potatoes NZ Inc.

Potatoes NZ Inc. became incorporated in 2012; previously it had been operating as a product group within Horticulture New Zealand. In June 2013 PNZ started collecting a commodity levy in accordance with the Commodity Levies Act (1990).

Grower members' records are now being updated with a commodity levy payment record, so that accurate recording of commodity levy collection is achieved. This updating process also includes agents now submitting their levy payments online, completing the sales-levy loop. Growers will be able to see the current financial year's levies in their membership account.

Why the need?

Growers requested that they be able to see a record of the levies paid on their behalf by buyers of potatoes (levy collection agents). Potatoes NZ wanted to be able to verify that levies had in fact been paid and therefore the grower was a verified member of PNZ and had the right to vote.

The work so far

PNZ has been streamlining its information systems using the specially developed membership database *Biosecurity Emission Levy Information System* known as BELIS. BELIS is being piloted by PNZ this Spring.

Next steps for growers:

- The database is planned to go live at the end of October after a grower testing phase.
- Growers will receive an email inviting them to log in to the membership database.
- Administrative support will be available through Nicola Loach (PNZ administration officer).
- Growers will initially be able to see BCI (Direct Sales – Buyers Commercial Invoice) levies and update staffing and contacts information.

The long-term BELIS goals

BELIS also gives our industry the ability to do so much more than administrative tracking. BELIS is building the capability for crop mapping, and a Certified Seed database. BELIS will eventually provide a seed to plate tracking and tracing tool.

An example of the meaningful benefits of this to growers, is the ability for PNZ information systems to track and report improvements in nutrient management, which are critical to achieving zero emissions. Zero Net Emissions is one of PNZ's three key strategic objectives.

Providing a digital platform to monitor, report and manage leaching, provides benchmarking to track progress as part of the *Sustainable Vegetable Systems* project.

BELIS has been developed to incorporate mapping data for biosecurity and traceability reasons, which will improve our readiness and response activities.

Sharing the inter-operable data between existing and planned information systems in a permissioned manner is further envisaged to provide tools for growers and industry to better plan and manage towards farm, industry and national goals.

The linking of crop maps to economic and emissions data reporting has been built in and will come to life in a workstream add-on to the *Sustainable Vegetable Systems* (SVS) project, known as Workstream 6, which will be managed by TrackBack Ltd and involves collaboration with Trust Alliance New Zealand (TANZ). Linking databases where appropriate will streamline the compliance costs and reduce the burden on growers by having information systems that are able to exchange data within pre-agreed protocols. There is potential for blockchain technology to use shared data in a permissioned way.

Our vision

Potato sector data (BELIS) is managed and shared easily through an enabling ecosystem, to participants in the value chain. Clear data ownership and governance has been built within the potato sector to provide trust and confidence. The data is easy to collect and share, supporting better decision making, generating value and insight within and across the potato value chains. The data ecosystem enables implementation of the Potato Industry Recovery and Transformation Plan.

So how will this data project support the future of our industry?

- Data will support better decisions for all.
- Data collection effort will be minimised.
- Data will be current, valuable and trusted.
- Data will be used to build trust in the food system.
- Data will further enable and verify industry care for the environment.
- The value of data sharing will be demonstrated and translated into action.
- There will be strong governance over data.
- There will be good infrastructure (e.g. mobile network access) to enable the use of the tools.
- Data will be secure and used appropriately by all.

The direct benefits to growers include:

- Ensuring grower levies are reported to the grower in a timely and accurate manner.
- Verifying PNZ membership and ability therefore to vote.
- Enabling a self-auditing system which will reduce PNZ compliance costs.
- Enabling growers to add staff to mailing lists.
- Ensuring tracking and traceability of product, emissions and biosecurity (at a later date).

This is an exciting, transformative step for our industry.

We ask potato growers to check their inbox for the invitation email to log in to BELIS.

TOMATOESNZ 2020 AGM

Words by Helen Barnes : General Manager, TomatoesNZ Inc.

TomatoesNZ Board and supporting staff

We held our Annual General Meeting online by Zoom on 25 September 2020.

Whilst it was a bit different to a face-to-face meeting, restrictions due to Covid-19 meant the ability to use Zoom was a pretty effective alternative, and 28 growers and associates joined the meeting.

Barry O'Neil talked on the new fresh tomato industry strategy developed by the Board earlier this year, noting that TomatoesNZ is well placed to meet the challenges ahead. An overview of the strategy was given in last month's column.

Helen updated on key areas that we had invested in this year, including R&D, automation, biosecurity, capacity building and a strong focus on looking at energy efficiency options for growers. She also advised of plans to tell the New Zealand tomato growing story more widely and raise the profile of the industry.

Two retiring Board members were recognised for their contributions to the industry. Lex Dillion from NZ Hothouse retired at the AGM after over twenty years of service. Edward Lee, a grower in South Auckland who is no longer growing tomatoes, was thanked for his three years on the Board and his help in several areas including translation and communication of key information to Chinese growers.

Fresh tomato **levy rates were confirmed** and remain the same at **0.35% for the commodity levy.** Also confirmed was **0.10% for the biosecurity levy** at first point of sale.

Covered Crops Remit

Roelf Schreuder, production director protected crops at New Zealand Gourmet, spoke to the remit he had proposed:

> That TomatoesNZ Inc. and Vegetables NZ Inc develop options for, and an opportunity to vote on, combining covered crops under one representative product group or body.

The remit was supported at both the TomatoesNZ and Vegetables NZ Inc AGMs.

A small working group of members of TNZ and VNZI will develop a proposal for consultation with all members in the first half of next year.

This will include several options or models for a new 'combined covered crops' representative body, and their pros and cons, which will then be socialised amongst the members of each product group.

Members' most preferred option will be put to a vote (against the status quo) at or around the time of the next AGM, which is scheduled for the first week of August 2021.

> If you would like to be involved in the process, or have questions, please contact any of the staff (Helen or Karen ph. **04 472 3795**) or Board.

TomatoesNZ Board

The TomatoesNZ elected and co-opted Board members, chair and vice chair have been confirmed as:

Barry O'Neil, independent chair

Simon Watson, NZ Hothouse, elected member, vice chair

Anthony Tringham, The Curious Croppers, elected member

Albert Shih, Vege Fresh Growers Ltd, elected member

Mike Saklani, Wing Shing Farms Ltd, elected member

Callum Grant, Kakanui Tomatoes, elected member

Pierre Gargiulo, JS Ewers, co-opted member

Ben Smith, T&G Global, co-opted member

Stefan Vogrincic, Grower2Grower, co-opted member

Andrew Hutchinson, T&G Global, observer

Allen Lim, Jade Garden Produce Ltd, observer from Vegetables NZ Inc.

There is currently one vacancy for an elected member.

Automation project

TomatoesNZ is pleased to be able to provide funding support towards the first stage of developing a labour-saving robotic solution for greenhouse vegetables by FTEK Limited. FTEK are a Pukekohe-based engineering company specialising in design and manufacture of greenhouse vegetable crop maintenance equipment. The robotics project is a collaboration with Callaghan Innovation and others.

We will provide more information on the project as it progresses.

Renewable Energy policy

On 7 October, Jacinda Arden announced that if re-elected Labour will phase out fossil fuels in process heat by preventing installation of new low and medium temperature coal-fired boilers.

The Ministry of Business, Innovation and Employment (MBIE) consulted on this very thing back in February in their *Accelerating renewable energy and energy efficiency* consultation, which we submitted on (in conjunction with Horticulture New Zealand and others). Just after Labour's announcement, MBIE released their summary of submissions on that consultation.

Proposals consulted on in that document included banning new coal-fired boilers for low and medium temperature requirements, and requiring existing coal-fired process heat equipment for end-use temperature requirements below 100 degrees Celsius to be phased out by 2030.

We strongly disagreed with these proposals because there are currently no proven, cost effective alternatives to coal in much of the South Island for greenhouse growers. Growers using coal are already facing increasing Emission Trading Scheme (ETS) costs making affordability of converting even more difficult. These growers could exit the industry as ETS costs rise because they cannot afford to convert and this will reduce food security for New Zealanders, probably with no reduction in global greenhouse gas emissions, since the vegetables will be replaced with imports that are not subjected to carbon pricing. We also advocated for more government support for conversion to renewable energies.

> "We were disappointed to see that our concerns about phasing out coal boilers, particularly the concerns about food security, were not addressed

We were disappointed to see that our concerns about phasing out coal boilers, particularly the concerns about food security, were not addressed in the "summary of submissions". However, MBIE did acknowledge submitters' calls for more government support for implementation of new, renewable technologies. You can read more on this at: https://www.mbie.govt.nz/have-your-say/accelerating-renewable-energy-and-energy-efficiency/

Since we made our submission to MBIE in February we have been working closely with the Energy Efficiency Conservation Authority (EECA) on ways to support growers who are looking to make a change to renewable energy sources. We are pleased to have their involvement with reviewing options for growers.

FIRST LIGHT ON GISBORNE

Words by Antony Heywood : General Manager, Vegetables New Zealand Inc.

Richard Burke, LeaderBrand chief executive officer, is not alone in thinking that Gisborne has a lot to offer horticulture and New Zealand's economic growth.

Over the past five years, Gisborne has seen an explosion in horticulture ventures, with expansion in vegetable growing, kiwifruit orchards, Māori agribusiness and new apple developments.

This is on top of the many other horticulture crops grown in Gisborne, including citrus, wine grapes and process vegetables for Cedenco. One thing Richard says Gisborne did not get was the dairy boom of the 2000s. What that did for the area was limit investment in infrastructure.

Industry growth usually comes with investment in the supply chain – roads, rail and ports all meeting increased demand from industry. Gisborne missed out on that investment cycle, so today it is playing catch up on the capital investment that it needs to meet new business.

7.2%

IN 2019, THE GISBORNE REGION'S GROSS DOMESTIC PRODUCT (GDP) ROSE 7.2%, THE HIGHEST OF ANY REGION.

6.6%

MARLBOROUGH WAS SECOND AT 6.6%

6.4%

FOLLOWED BY WAIKATO AT 6.4%.

https://www.stats.govt.nz/news/2019-regional-gdp-figures-show-gisborne-tops-increases

Without investment in infrastructure, it will be hard for the new businesses to capitalise on the growth potential. This will in turn have a negative effect on the job market, ancillary business growth, and investment in schools, urban development and infrastructure.

What are the right levers to help Gisborne grow? Richard says it's not rocket science, it's more like rocket in a bag. LeaderBrand leads the product category of salad in a bag. It estimates that it has 40% of the bagged salad market. What sets LeaderBrand apart from the competition is full market coverage.

LeaderBrand products must be competitive in Invercargill as well as Gisborne. To do this, the company has invested in the supply chain from Gisborne to optimise scale to be competitive in all New Zealand markets. To ensure this continues in the future, they have adapted through using technology, and with a willingness to get the job done.

What really grinds Richard's gears is the procrastination that has developed because of New Zealand's success in dealing with Covid-19. He is sure there are some good reasons for the slowdown but says we need to get real, being kind to each other is over, and what really needs to happen is for people to be effective.

Nothing frustrates business more than having to wait for no good reason, and then on top of that, having to pay extra, supposedly to compensate for so-called Covid-19 forces. If New Zealand is serious about transforming the economy post-Covid, we need to change our attitudes and our practices. That should start with minimising or removing the red tape of building consents, and reviewing the Resource Management Act. Sort that out so rural New Zealand can really get moving and Gisborne will thrive.

A March 2019 survey by Construction Marketing Services and supported by the Registered Master Builders Federation has found that red tape was a top problem for the construction industry. Some 80 per cent of respondents said red tape was the biggest obstacle to consenting and building delays when asked about key issues facing the industry. Other key issues facing the industry identified by 70 per cent and more of respondents were the high cost and shortage of skilled labour and the cost and quality of building materials.

https://www.stuff.co.nz/business/112347709/red-tape-and-high-costs-are-strangling-the-building-industry-new-survey-reveals?rm=a

TURNKEY DESIGN AND BUILD

Tuatara Structures may be a relatively young construction company; however, they make up for that with a team that has amassed over 150 years of combined construction industry experience, and who are dedicated to providing clients with innovative solutions to their building needs.

Their turnkey design and build construction solutions are ideal for cool stores, packhouses, food processing, and storage facilities.

Tuatara Structures understands the time constraints of production-based businesses. Their experience meeting seasonal deadlines in past projects means they know that your business operations cannot be affected by construction delays.

The unique swing-leg roof lift technique utilised by Tuatara means their buildings are not only faster, but safer, and more cost-effective to construct than the industry standard. Because, while meeting build deadlines is a priority, meeting budgets is just as crucial to Tuatara.

As part of their commitment to client satisfaction, the Tuatara Structures team offer clients a complimentary, obligation-free feasibility study, with detailed drawings. This process involves meeting to discuss the project needs, budget, unique operations and product flow, and potential location options.

Following this consultation, Tuatara presents the client with concept drawings and a fixed-price investment proposal for consideration. Their plans and investment proposals are often delivered to the client faster than other building companies can even get on-site for an initial meeting.

Proposals encompass all components of the build process – from consenting, site works, and the build itself, through to office fit-outs, racking, refrigeration, and other specialist trades. They can also undertake all civil works, drainage, wastewater, landscaping, and fencing if required.

Their detailed concept plans and fixed-price investment proposals are essential elements in the Tuatara process. The contracts provide clients with absolute budget certainty and can help to secure lending approval and board-level sign off when required.

Tuatara is genuinely disrupting the old-school ways of the whole design-build process, and do it with vigour and passion. Their strategy and determination to provide clients with a streamlined build process have produced some impressive results in their five years since entering the market.

They have worked with a wide range of agri-business industry clients, including Turners & Growers, Thomas Brothers Orchards, Ohapi Fresh, Stonewall Farms, Atlas Agriculture, and Landpower amongst others.

Industry projects range from a combined cool store, canopy, and packhouse measuring almost 6000m², to a 360m² onion drying facility, and the earthquake strengthening and refurbishment of a large retail showroom and offices with a 500m² workshop addition.

Clients Bill and Fred Thomas of Thomas Brothers Orchards had the following to say regarding their experience with Tuatara, 'We were continually impressed with how easy Tuatara Structures made the building process. None of the challenges we threw at them was a problem, and we were always met with a clever solution, delivered in record time.'

If you have a build project that you'd like to discuss with Tuatara Structures, don't hesitate to get in touch with their dedicated team.

Either give them a call on **0800 600 750** or send an email to **enquiries@tuatarastructures.com**. Alternatively, check out their website, **www.tuatarastructures.com**, to learn more about how they can rise to your construction challenge.

CONTROLLING HUMIDITY, SAVING ENERGY AND IMPROVING YIELDS WITH DRYGAIR

Humidity is one of the biggest problems in greenhouse growing. High humidity causes disease outbreaks and reduces fruit size and yield. But controlling humidity traditionally wastes a lot of energy – and money.

Southern Belle Orchard in Matamata has been using DryGair dehumidifiers in their pepper greenhouses for over a year now. We spoke to owner, Frans de Jong, about how DryGair has improved his operation.

Saving Energy with DryGair Dehumidifiers

"Energy saving is one of the most important factors to keep greenhouse growing viable", Frans declares. The traditional method of ventilating in order to reduce humidity is wasteful and inefficient, causing heaters to run overtime, to compensate for the lost heat.

"The dehumidifiers work in conjunction with the heaters and roof vents for an optimal climate inside the greenhouses", de Jong describes how using DryGair has changed his climate control method. "The result was that the roof vents can stay closed more often, and the heaters will be used less, especially to vent out warm humid air, as would happen in a conventional greenhouse setup". During humid days, the dehumidifiers in the Southern Belle Orchard greenhouses are turned on for an average of 16 hours a day.

Using Humidity Control to Promote Higher Quality and Larger Yields

Dehumidification isn't just about energy savings though. Reducing humidity levels in the greenhouse stimulates the plants, allowing them to transpire more water through the stomata. This promotes more nutrient uptake, making crops grow faster and larger. According to de Jong, yearly production has gone up 15% since incorporating DryGair.

Humidity control improves greenhouse climate conditions, which promotes higher quality fruit as well. At Southern Belle Orchard they're well aware of this – "Keeping the humidity on a constant level has definitely improved the quality".

The rise in production and quality is partly due to better conditions for the plants. The other part of the equation is the control over disease outbreaks related to fungal pathogens such as botrytis or powdery mildew.

"Fungal and bacterial issues are nonexistent, as we have full control over the humidity. This is another cost saving as no sprays are required to deal with any problems" Frans says.

The Benefits of Dehumidification

Choice Seedlings of Australia have also been using DryGair to control humidity. General manager Manu Siitonen considers DryGair dehumidification to be the most efficient method to reduce greenhouse humidity, both in terms of energy savings and to provide plants with their ideal conditions. "When you enter the greenhouse in the morning and touch dry plants with DryGair vs. wet plants without, the difference is immediately clear to us", Siitonen sums it up.

By dealing with humidity problems inside, growers can close the greenhouse and increase their control over the environment inside, leading to:

- Less heat loss and lower energy expenses
- Reduced or even total elimination of diseases and pesticide use
- Homogenous climate, leading to more uniform fruit
- Reusable distilled water from dehumidifier operation
- Higher CO_2 concentration

DryGair is designed specifically for horticultural use. Under common greenhouse conditions, the dehumidifier removes 45 liters of water per hour, running on only 10 kW.

For more information contact Brinkman Australia on **info@royalbrinkman.com.au** or **+61 3 9587 2566**

DURING THESE UNCERTAIN TIMES, HOW IMPORTANT IS IT FOR NEW ZEALAND BUSINESSES TO TAKE CARE OF EACH OTHER?

Oji Fibre Solutions

At Oji Fibre Solutions we live and breathe 'Made in New Zealand'

We are New Zealand's only fully integrated paper packaging manufacturer. We harvest New Zealand timber from sustainably managed plantation forests and process the wood products at our Kinleith Pulp and Paper mill near Tokoroa, where we produce the paper products used to manufacture corrugate boxes and multiwall paper bags at our packaging sites across New Zealand. We employ over 1500 New Zealanders, and with many more relying on us in the related forestry industries, often in rural areas of New Zealand where OjiFS supports the local communities.

> **"Innovation is key to our culture and we are constantly striving to deliver higher quality products that are fit-for-purpose, sustainably produced and recyclable**

Oji Fibre Solutions' operations are classified as an essential service, and during the recent Level 3 and Level 4 restrictions, our sole focus was to ensure that we prioritised supply of packaging to our partners still producing product in essential industries. This included the supply of multiwall paper bags from our manufacturing site in Auckland to our customers in food industries such as vegetables, flour, sugar, grain, seed and milk powder, etc.

We also have 3 corrugated case manufacturing plants in Auckland, Hamilton, Levin and Christchurch from where we supply the essential packaging required to ship product safely around the country and keep the supermarkets stocked, and New Zealanders fed.

We pride ourselves on being a New Zealand based supplier of paper-based packaging where the product is New Zealand made and can be collected and recycled via Fullcircle, our recycling business unit. All our packaging sites are FSC and PEFC certified, giving consumers the peace of mind that they are using products that have been responsibly sourced. Innovation is key to our culture and we are constantly striving to deliver higher quality products that are fit-for-purpose, sustainably produced and recyclable.

If you would like to know more about how Oji Fibre Solutions can assist with your packaging requirements please contact Mark Longley on **027 4548031** / **mark.longley@ojifs.com**

THE NEXT BEST… NEW TELEGRAPH CUCUMBERS FROM PREMIER SEEDS

Premier Seeds is strongly committed to support their growers to achieve successful crops and are always looking for the next best varieties to provide the optimal solution for their customers.

Premier Seeds is nourishing an excellent relationship with their cucumber breeder Fito Semillas in Spain, a 5th generation breeder and seed supplier, founded in 1880 in Barcelona. 'Fito has a strong presence in more than 70 countries and is specialized in genetic improvements, the production and distribution of seeds for horticulture and field crops, and is committed to research development and innovation. The close contact, good communication and occasional visits, reinforces our feeling of confidence in the ongoing pipeline of new and improved varieties coming from the Fito breeding programme to find varieties that suit the requirements of our growers and their locations as well as the market", says Imke Blackett from Premier Seeds.

Whilst most of the currently available varieties have been performing well for many years, as a seed supplier Premier Seeds is continuously looking for the 'next generation' of breeding.

The varietal selection is a lengthy process and involves the expertise and experience of the Fito cucurbit breeder and their international export manager when choosing suitable varieties from a large cucumber portfolio. Selection criteria include our challenging New Zealand climate and our market requirements. Root diseases lead us to select varieties with a very strong root system to be able to withstand any Pythium and Fusarium during the crop cycle – we call it "stronger for longer"! Due to our climate, Powdery Mildew is still a large-scale issue for many growers and whilst it seems a lesser problem for many other countries, we are looking for the breed resistance in the resistance package when selecting.

Once varieties are selected, the trial work begins with small numbered trials at interested and selected growers. Each trial is carefully assessed, the performance documented, and results shared with Fito for future breeding work. If proven successful, the variety will move into larger or span trials. On occasions we have found a variety successful for our climate but not successful in the global market and it has been discontinued, so the work starts again… Consequently, it can take several years before we are satisfied with the performance of a variety and decide to commercialise.

In 2019 we introduced 2 new spring/summer/autumn varieties:

Catalina: (Trialled as FHOL 005)
Resistances: IR: PM; CVYV; Cy

Suitable for spring, summer and early autumn plantings. A strong plant with medium length and open habit suitable for all growing structures. Produces high yield of quality 30-33cm dark green fruit. Good production on both, stem and laterals. Strong root system enables long term plant vigour and production.

Florencia: (Trialled as FHOL 083)
Resistances: IR: PM; CVYV; CYSDV

Suitable for spring, summer and early autumn planting. Has strong plant and root vigour coupled with a compact / medium plant length. Achieves high yields of 32-36cm long dark green fruits with minimal necks. Suited to both stem and lateral production and has a very good long-term endurance.

After 3 years of trials, we are now introducing 2 new autumn/winter/spring varieties:

Carranza (Trialled as FHOL 125)
Resistances: HR: Cca, Ccu IR: CYYV; CYSDV

Suitable for autumn, winter and spring plantings. Vigorous plant, open habit with medium length. Good in cold conditions. Strong root system enables high yield of 32-35cm dark green fruit.

Caobado (Trialed as FHOL 180)
Resistances: HR: Cca; Ccu IR: PM; CVYV; CYSDV

Vigorous plant with a strong root system, open plant habit. Dark green leaves with short internodes for ease of crop work, strong partial resistance to Powdery Mildew. Fruits are of 31-34cm length, minimal neck, capable of high yields of dark green fruits of high quality. Recommended for autumn, winter, spring production.

We strongly believe that all our cucumbers are competitively priced.

If you have any further inquiries or are interested in trial seed, please contact: Imke Blackett: **027 2444 611**, **imke.blackett@premierseeds.co.nz** or Benjamin Carrell: **027 2444 651**, **benjamin.carrell@premierseeds.co.nz**

A GAME CHANGING FUNGICIDE DEVELOPMENT FOR BRASSICA PRODUCERS IS HERE

New Zealand vegetable and leafy brassica growers have a new option this season for preventing clubroot infection in their crops.

Amishield® is a contact and protectant fungicide for use as a seedling tray drench applied immediately prior to transplanting. It has been extensively trialed in New Zealand and offers the industry an alternative treatment system to commonly used clubroot fungicide programmes.

Alan Cliffe, Development Manager for Nufarm, says instead of having to rely solely on broadcasting or strip treating in the field with other preventative compounds, as is the case at present, Amishield means growers can plant seedlings that are already protected from club root.

In soils where the disease is already present, Amishield as a seedling tray drench won't prevent potential subsequent infection of seedling roots as they extend beyond the treated plug area.

Nor will it eliminate the potential need for additional control measures under severe disease pressure, especially for crops that require two to three months or more to reach maturity.

> **"In addition to strong preventative activity, the active ingredient in Amishield (amisulbrom), inhibits secondary infection and has excellent crop safety**

But the protection given by Amishield as a seedling tray drench generally improves crop yield, and when it comes to the most serious disease of New Zealand's brassica growing areas, which not only reduces marketable yield but sometimes totally destroys crops, this is a key benefit, he says.

"As a good example, in some Nufarm trials in support of the ACVM approval application, Amishield treated plants still had a relatively high clubroot score at harvest.

"However, they also showed a significant yield response compared to both the untreated control, and a standard pre-plant incorporated fungicide.

"This is due to the improvement in root development, especially of the root hairs, within the treated zone when the plants are establishing."

In addition to strong preventative activity, the active ingredient in Amishield (amisulbrom), inhibits secondary infection and has excellent crop safety.

It works by killing the motile zoospores of the clubroot fungus, which infect the root hairs of brassica plants.

Amishield is the first formulation containing amisulbrom to be released to the NZ market, and Alan Cliffe says that means it also provides an alternative mode of action (MOA) for clubroot resistance management.

Amishield belongs to FRAC Group 21 (Qil fungicides).

It comes in a water dispersable granule (WDG) formulation that is easy to mix and measure and has an efficient low dose rate of 20 g/1000 plants, making it ideal for nurseries.

It is also a flexible mixing partner in that it may be applied in a seedling tray drench mixture with thiamethoxam and chlorantraniliprole insecticides.

Amishield 500WG has little systemic activity, and little soil movement, and poses low risk to earthworms, birds and pollinators.

It will be available from early 2021 and in a convenient 3kg pack.

For more detail talk to your agronomist or local Nufarm Territory Manager on **0800 NUFARM** today.

®Amishield is a registered trademark of Nufarm Australia Limited

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