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HORTICULTURE NEW ZEALAND

PLANNING FOR A GREEN-ENERGY FUTURE

PAGES 22 & 52

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Collaborating, innovating and supporting growers in New Zealand

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Cover photo by Emily Pope.

WHAT'S NEW

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

HE WAKA EKE NOA – WHAT IT MEANS FOR GROWERS

Barry O'Neil : HortNZ president

He Waka Eke Noa (HWEN) represents a partnership between primary industries, government and Māori agribusiness, that is trying to find ways of reducing agricultural emissions while maintaining sustainable food and fibre production and profitability.

And therein lies the issue: reducing emissions while maintaining food and fibre productivity and profitability without yet having all the tools needed to achieve this. It was always going to be a challenge! The primary sector is still the major player in our economy, with over 80 percent of our exports and 11 percent of gross domestic profit (GDP) coming from it – including through the Covid-19 pandemic. The last thing we would want to see as a country is HWEN forcing the food and fibre sector to shrink.

Primary industries have always been committed to doing their very best to mitigate the impacts of climate change – we just didn't want to be taxed. We didn't want an approach and pricing mechanism that was focused primarily on revenue collection, but rather one that would support improved practices and behaviours and invest any revenue in finding new tools to maintain and increase production levels and profitability with lower emission levels.

The HWEN partnership was formed in response to the government's plan for primary industries to begin paying a price on emissions. It was the only opportunity to find an alternative to government putting agriculture into the Emissions Trading Scheme (ETS), which would be the tax approach we didn't want.

New Zealand has already passed climate law, the Climate Change Response (Zero Carbon) Amendment Act 2019, establishing long-term emission targets, the mandate for emissions budgets and an independent Climate Change Commission to advise government. The bill passed unanimously, meaning all political parties supported it, not only Labour and the Greens.

> "The primary sector is still the major player in our economy, with over 80 percent of our exports and 11 percent of gross domestic profit (GDP) coming from it – including through the Covid-19 pandemic

Targets have now been set in law, including a net greenhouse gas emissions target of zero by 2050, reducing methane emissions by up to 47 percent and requiring biogenic emissions from agriculture (methane and nitrous oxide) to have a carbon price in place from 2025.

HWEN partners considered and consulted on various options with the key elements of split gases (methane priced lower than nitrous oxide as it is a shorter-lived gas) and providing for sequestration to offset emissions.

A farm level split gas pricing mechanism was supported by sector partners, which includes:

- Calculating short (methane) and long-lived (nitrous and carbon dioxide) emissions.
- Recognition of on farm efficiencies and mitigations, along with incentivising use of approved practices and technologies that reduce emissions.
- On farm sequestration ineligible for the ETS available to offset the cost of the emissions levy.
- Levy revenue is reinvested in research, development and extension.
- An oversight Board with expertise and representation from the primary sector providing recommendations on levy rates and who sets the strategy for use of levy revenue.

HWEN has a logical focus on pastoral farming as they are by far the largest agriculture emitters. Horticulture, by contrast, contributes less than one percent of New Zealand's total agriculture emissions.

The thresholds agreed upon for animal numbers and levels of fertiliser use account for 97 percent of all agriculture emissions. Rather than add to the complexity and administration costs by requiring all farmers and growers to comply with the system, it was logical the focus would be on the largest group of emitters. This isn't picking on the largest farmers

and growers, rather it is an efficiency argument that still achieves the emissions reductions without cumbersome and large administration costs.

> **As growers, we need to take climate change seriously, do what we can to minimise emissions and mitigate the real risks that we are starting to see happen in New Zealand and around the world**

For horticulture, growers who apply over 40 tonnes of nitrogen through synthetic fertiliser per year will be liable to pay a levy under HWEN.

This equates to less than 200 growers who will be involved, as most don't use more than 40 tonnes of nitrogen per year. Even though the majority of our 6000 growers will not be part of the scheme, all growers still need to do their very best to reduce their emissions.

There is also the potential for the growers involved to offset costs using sequestration or approved practices and technologies. Horticulture New Zealand commissioned a report from Plant & Food Research Ltd on what sequestration opportunities there are in horticulture. Unfortunately, they concluded we don't have that much opportunity as growers to use sequestration offsets, other than in recently developed orchards.

What will it cost the growers that are involved? HWEN wants a price ceiling where the levy rate for each gas would be no more than if agriculture entered the New Zealand ETS (along with the government's commitment of 95 percent free allocation phasing down by one percent per annum). While costs will surely increase as the carbon price increases and free allocation reduces, the HWEN proposal will initially cost growers that use more than 40 tonnes of nitrogen in the order of an additional $7 per tonne.

The HWEN proposal will now be reviewed by the Climate Change Commission. Government will make a final decision on the recommendations in December. If progress to reduce emissions is insufficient, the Act includes provisions for agricultural emissions to be brought under the New Zealand ETS at a processor level. If that happens, the impact on horticulture would be similar, apart from all 6000 growers paying the $7 per tonne, as it would be based on anyone who purchases fertiliser.

Despite frustrations and emotion colouring the debate over how agriculture greenhouse gas emissions should be priced, horticulture is already well positioned as a food and fibre sector.

As growers, we need to take climate change seriously, do what we can to minimise emissions and mitigate the real risks that we are starting to see happen in New Zealand and around the world. Many of us have taken or are starting to take action in this regard, but this journey must continue for us all. As we learn more about improved ways of growing that reduce emissions, we must be early adopters. And we can't lose sight of what our consumers are increasingly demanding, as well as doing what is right for New Zealand and our international responsibility.

I would like to especially thank HortNZ's strategy and policy manager, Michelle Sands, for her expertise, guidance and patience as we worked through this very complex issue. Michelle was part of the HWEN steering group and has been outstanding in her efforts to get the right outcomes for horticulture and growers.

Kia kaha

NZGROWER

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Your Levy AT WORK

MPA Associate Member (NZ)

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WILL STEADY GROWTH BE ENOUGH?

Nadine Tunley : HortNZ chief executive

The latest *Situation and Outlook for Primary Industries* (SOPI) report has horticulture – including wine – growing steadily, with export revenue forecast to increase by two percent to $6.7 billion for the year to 30 June 2022, driven by record harvest volumes for gold kiwifruit and wine grapes.

This steady growth is in the context of the objective to double the farmgate value of horticultural production from $6 billion to $12 billion by 2030 while at the same time, improving grower margins.

Concurrent with the release of the SOPI report, the Ministry for Primary Industries (MPI) also released a progress update on *Fit for a Better World*, which is a multimillion-dollar programme "for accelerating New Zealand's food and fibre potential."

This report shows that MPI and our industry has invested almost $117 million in horticulture industry projects between June 2018 and May 2022. It shows that this level of investment is the highest in the food and fibre sector, with dairy coming next at just over $93 million. Some would see this as a clear signal from the government that it supports seeing more focus on horticultural development to assist in New Zealand's climate response requirements.

Much of the investment in horticulture to date has been focused on *technology* such as the robotic asparagus harvester; *sustainability* through a spray-free future for our apple industry, as well as the *A Lighter Touch* programme, which will reduce the use of agrichemicals across multiple crops; and *diversity*, that is, getting a wider range of people to consider careers in horticulture.

In the coming year, investment is expected to focus on improved breeding of cultivars, and rootstock trials for a wide range of fruit and some vegetables; and market access and development, with investment in other years being directed by the Horticulture Action Plan, currently under development.

The Horticulture Action Plan needs to bring everything together and deal to the contradictions that abound within current government policy as it affects the food and fibre sector. On the one hand we have high levels of investment in the future but on the other, we have growers across our industry struggling to survive, thanks to the often complex and contradictory policies and practices that do not support growing and business, in the context of ever rising production costs and drastically reduced margins.

Our industry has been remarkably resilient over the past two Covid-19 affected years. However, it will not be able to reach its potential, the *Fit for a Better World* targets and the government's objectives for the food and fibre sector if the government continues to 'give with one hand and take away with the other.'

At the moment, there are just too many contradictory things going on. The government says the country cannot rely on migrant labour, but it celebrates the lowest unemployment figures in more than 50 years. At the same time, the government introduces an Income Insurance proposal closely followed by the Fair Pay Agreement proposal, both of which Horticulture New Zealand has joined with product groups and organisations such as Business New Zealand to oppose.

At a recent government event, a Minister stood up and said the government 'can't fix the labour shortage' and was leaving the solution to 'market pressures and responses.' In normal market conditions, we would turn to migrant labour to assist us in our growth to meet the required government growth targets, which will in turn assist New Zealand in its economic recovery post the past two Covid hampered years.

I have been deeply saddened to hear of an orchard that has been in a family for 108 years being removed because it has just become too tough. Small to medium size operations, be it vegetables or fruit, are under excruciating pressure, financially and emotionally. I have had these growers ask me, 'is this government not here to fight for me the small to medium operator?' Again, amidst the contradiction and confusion, I have no answers for these growers at the moment.

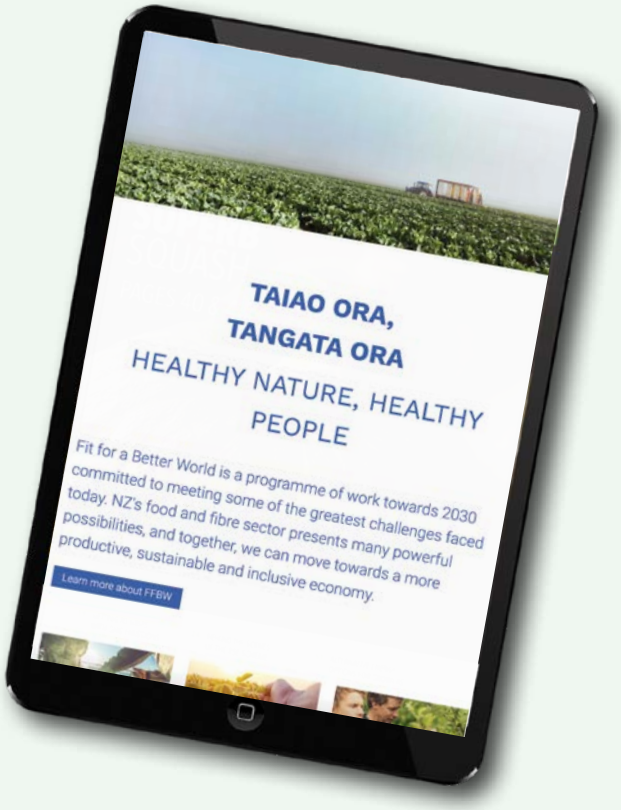
A step change is required

In answer to the question I posed at the beginning of this column, no, steady growth will not be enough for us, the horticulture industry, to meet our potential and targets. There are just too many headwinds in today's world for that to happen.

We need to accelerate growth across our industry in order to take advantage of one of the chief factors we have in our favour. That is, growing worldwide demand for New Zealand produced food and fibre.

New Zealand Inc is a fantastic brand especially right now, in a world far more focused on how things are done, which in our case is how things are grown – sustainably, with respect for the environment, people and the land, from 'paddock to plate.'

The government must come together and align to support New Zealand Inc and the food and fibre sector's goals, as outlined in *Fit for a Better World*. Without that alignment, return on our industry and the government's investment will just not be as high as it could be, which will be a grave waste of opportunity. ●



YOUR LEVY AT WORK

INDUSTRY WIDE ISSUES FOR INDUSTRY GOOD

NATURAL RESOURCES AND ENVIRONMENT

Michelle Sands : HortNZ policy and risk manager

Climate Change Adaptation

The Government's draft plan sets out actions to support the adaptation of all sectors and communities to the locked-in impacts of climate change, like rising sea levels and more frequent and severe weather events.

HortNZ submitted on the Climate Change Adaptation Plan in June 2022. Key issues raised were:

- Plant varieties and breeding
- Biosecurity risks and management
- Flood protection and land drainage
- Infrastructure investment
- Maintaining the productive capacity of highly productive land
- Food security
- Seeking greater clarity on proposals within the Climate Change Adaptation Act.

NPS Freshwater and NES Freshwater revisions submission

A number of changes are proposed to the National Policy Statement for Freshwater Management (NPS-FM) and the National Environmental Standards for Freshwater (NES-FW). These changes relate primarily to the wetlands provisions and also include other changes that seek to improve clarity and correct error.

The changes relating to wetlands are in response to consultation on the Managing our Wetlands discussion document. HortNZ submitted on the discussion document and will prepare a submission on the NPS-FM and NES-FW.

Key issues for HortNZ related to wetlands:

- Ensuring constructed wetlands and planted riparian margins are not captured
- Enabling biosecurity activities and responses.

National Policy Statement for Indigenous Biodiversity

The government has released an exposure draft of the proposed National Policy Statement for Indigenous Biodiversity (NPSIB). This exposure draft follows a consultation in 2019–2020.The changes made since the 2019–2020 version include:

- Addressing effects management in Significant Natural Areas
- Strengthening the role of tangata whenua in decision-making
- Including public conservation land within the scope of the NPSIB
- Tweaking the provisions for pastoral land, areas outside of significant natural areas and existing uses for clarity.

HortNZ submitted on the earlier draft and will work with growers to submit on the exposure draft as well.

Horticulture New Zealand
Ahumāra Kai Aotearoa

Horticulture New Zealand Notice of the 17th Annual General Meeting

Wednesday 21 September at 4.00pm at the Headingly Centre, 2 Headingly Lane, Richmond, Nelson

DATE CHANGE

Business

1 Welcome and Apologies
2 Voting and Proxies
3 Obituaries
4 Approve Minutes of the 16th AGM
5 President's and Chief Executive's Report on HortNZ's Activities
6 Approve Audited Financial Statements for year ended 31 March 2022
7 Levy Rate
8 Director Remuneration
9 Approve 2022/23 Budget
10 Approve Auditors for 2022/23
11 Notices of Motion
12 General Business

Call for Notices of Motion

Any Board Member, Affiliated Organisation or Active Grower Member wishing to have a matter considered at the AGM must give notice in writing to the Chief Executive of Horticulture New Zealand of the notice of motion no later than Wednesday, 3 August 2022 at 4.00pm. Notices should include the wording of the motion to be voted on and up to one A4 page of explanatory notes. Notices of motions will be listed on HortNZ's website **www.hortnz.co.nz** on 10 August 2022 and will feature in the HortNZ magazines (September issue). Any questions or notices can be sent to the Chief Executive c/-kerry.norman@hortnz.co.nz.

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GOVERNMENT POLICY UPDATES

Michelle Sands : HortNZ policy and risk manager

Income Insurance Proposal

The Income Insurance scheme proposed by the Government would support some workers with 80 percent of their income for up to seven months if they lose their job through no fault of their own. The scheme would also support some workers whose ability to work has been affected by a health condition or disability.

Horticulture New Zealand considers the scheme unfair because it would require compulsory contributions from horticultural workers, but many horticultural workers would never be eligible to receive payments under the scheme.

HortNZ submitted on the proposal in April 2022. The key issues raised in our submission were:

- The proposal is unfair for people who work on short-term contracts.
- The proposal is unfair for industries that offer employment to those starting off in or re-entering the workforce.
- The proposal is unfair for industries that employ migrant labour.

HortNZ suggested several changes to address these issues and is meeting with the Ministry of Business, Innovation and Employment (MBIE) to provide more input.

Fair Pay Agreements Bill

The Fair Pay Agreements Bill would provide a framework for collective bargaining for fair pay agreements across entire industries or occupations, rather than just between unions and particular employers.

HortNZ submitted on the Bill in May 2022, then presented evidence at the Select Committee in June 2022. Key issues raised in our submission were:

- The proposal is disproportionate compared with its proposed benefits.
- The diversity of crops in the horticulture sector means the proposal seems unlikely to be workable.
- We do not agree with the criteria for the public interest. The criteria include migrant labour and seasonal labour, and we do not consider these factors are of themselves an indicator of a labour market problem.

HortNZ suggested several changes to address these issues and is meeting with the Ministry of Business, Innovation and Employment to provide more input

- We dispute the claim that increased labour costs would drive more investment in technology. Investment in technology is occurring, but for many roles there are no viable alternatives to human labour.

Modern Slavery and Worker Exploitation Legislation

The proposal would create new responsibilities across the operations and supply chains of all types of organisations in New Zealand, with more responsibilities for larger organisations.

Under the proposal:

- All organisations would be required to take action if they become aware of modern slavery or worker exploitation.
- Medium and large organisations would be required to disclose the steps they are taking.
- Large organisations and those with control over New Zealand employers would be required to undertake due diligence.

HortNZ submitted on the Bill in June 2022.

The key issues raised in our submission were:

- HortNZ broadly supports the proposal.
- We sought better alignment with Australian and United Kingdom legislation.
- We seek regulatory equivalence for Good Agricultural Practice (GAP) to enable growers to demonstrate that they meet the requirements through the use of GAP add-ons such as Global G.A.P. GRASP and NZGAP Social Practice and the contractor standard.


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A GUIDE TO NEW ZEALAND'S BIOSECURITY SYSTEM

Eve Pleydell : HortNZ risk policy advisor

Part 3: Guarding the gate – preventing pests and diseases from crossing our border

In this third article focussing on New Zealand's biosecurity system, we're looking at what happens at our country's border. In this increasingly interconnected and complex world, how do the biosecurity border teams know whether a passenger arriving from Australia is bringing an orange with them, or whether there are stowaway insects inside secondhand farm machinery being imported from Europe, or whether a small packet from South America contains seeds that someone has ordered on the internet?

Key points:

- Biosecurity New Zealand's border staff have the challenging job of checking whether people are following the biosecurity rules.
- Every year there is more air freight, sea freight, and international mail to check. Tourist numbers have taken a temporary knock but will go up again as international travel resumes.
- Risk assessments and intelligence are used to help identify the people and consignments that are more likely to be non-compliant and more scrutiny is applied to these.
- The border is more than just Biosecurity New Zealand's responsibility. Many functions, individuals and organisations contribute to providing our biosecurity line of defence.

Protecting New Zealand from biosecurity hazards becomes more challenging each year due to the steadily increasing volumes of cargo, people and mail that are arriving on our shores. According to Ministry of Transport figures, 513,809 containers of goods entered New Zealand in the ten months before March 2022.

Prior to Covid-19 border closures, the number of international tourists arriving had multiplied 1.5 times per decade since 1998, with 3.9 million people visiting our country in 2018.

As for international mail, New Zealand Post is investing hundreds of millions of dollars in increasing its capacity to handle the growing numbers of parcels and packages arriving from overseas. The number of people purchasing items online has been increasing steadily for several years, and while global Covid lockdowns have hit our high street stores, the electronic high street is booming and it brings a unique set of biosecurity challenges with it. How do online consumers know where the product they are purchasing is really from? How many of them are unaware of biosecurity requirements? What proportion of them may be trying to use this route to deliberately bypass biosecurity requirements?

When you take a step back and consider the situation, you quickly realise that to visually check every container, parcel and item of luggage brought into New Zealand would require a large regiment of border officers and impose significant delays on importations and travel. For this reason, the Ministry for Primary Industries (MPI) border staff rely on rapid risk assessments to help them decide how to manage individual passengers and consignments. We can see this happening when we return to New Zealand after an overseas trip. The border staff have a few short moments with each passenger to assess whether that person's luggage should be checked further or whether it is safe to let them enter without conducting a visual inspection. The x-ray machines and detector dogs then act as a second layer of protection to catch those forgotten about pieces of fruit or the deliberately hidden items in someone's bags. On the spot fines of $400 are used to help to deter non-compliance.

“ Prior to Covid-19 border closures, the number of international tourists arriving had multiplied 1.5 times per decade since 1998, with 3.9 million people visiting our country in 2018

In a similar way, all containers and cargo being brought into the country have to be accompanied by paperwork demonstrating that they have met the requirements and are safe to enter. Teams of evaluators assess this paperwork to check that the rules of the Import Health Standards have been complied with, and try to identify fraudulent and deliberately non-compliant activities. Based on this evaluation, either an MPI inspector will check the consignment themselves or they will clear it to go to an approved Transitional Facility where a trained Approved Person (a legal status) will conduct that inspection on MPI's behalf. This means that MPI inspectors are generally reserved to check the riskiest goods.

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In 2020–2021

16.3 million

importation documents were received by MPI. Screening these identified

277,000

to potentially pose a risk to biosecurity.

MPI uses performance and risk-based profiling to target border interventions to the right place at the right time. In 2020–2021, 16.3 million importation documents were received by MPI. Screening these identified 277,000 to potentially pose a risk to biosecurity. Following further risk assessment, 66,000 consignments were then individually inspected. MPI's website states that 20 percent of the containers inspected by MPI inspectors fail that inspection. This is a pretty high hit rate.

> **"It is unrealistic to simply expect our biosecurity border teams to catch everything. Each of us has a responsibility to make sure that we know what the requirements are and stick to them, and to ensure that our visitors or employees coming from overseas know what they can and cannot bring with them before they get to our border**

If irregularities are seen in paperwork or if visible contamination, high risk goods, or live insects are found, then MPI has the legal power to manage that situation by offering treatment, or reshipping the goods, or destroying them. It is the importer's responsibility to cover all costs incurred by these actions, and they may be subjected to a higher level of scrutiny the next time they bring something into the country.

Importers of horticultural plants also encounter another aspect of border quarantine procedures, the post-entry quarantine facility. Not all viruses, bacteria or fungi will cause visible signs of disease in the plants they have infected. This means young rootstock or budwood could be infected without showing signs. Growing the plants in a contained environment allows time for symptoms to develop and for diagnostic tests to be run before the plants are released into New Zealand. This is a necessary step in our biosecurity protection, but it does bring constraints and expense with it.

It is unrealistic to simply expect our biosecurity border teams to catch everything. Each of us has a responsibility to make sure that we know what the requirements are and stick to them, and to ensure that our visitors or employees coming from overseas know what they can and cannot bring with them before they get to our border. We can also consider calling out non-compliant behaviour when we see it, such as casual comments about things people have bought from overseas that may appear in a social media group we belong to. It is so easy to buy anything online from practically anywhere and sometimes people have not considered that what they are purchasing could be a risk to the country. When it comes to biosecurity, what each of us does matters.

Growing technical knowledge to benefit growers

Since taking on the leadership role of the Research and Development (R&D) and Technical Extension teams at Fruitfed Supplies, internally known as the Technical Team, Kevin Manning has seen a greater focus on sharing the knowledge gained through R&D trials to the wider Fruitfed Supplies team, growers and the industry as a whole.

With each technical specialist having specific experience in either vegetables, subtropical fruits, plant nutrition, viticulture or pipfruit and summerfruit, the company's Technical Horticultural Representatives (THRs) are equipped to provide growers with recommendations based on the latest trial results and developments for a crop.

"We train our THRs and in-store teams so they are continually up-to-date across different crops, including new products to market. We take the knowledge we gain from our R&D trials and turn it into practical applications for THRs to take to growers. This includes producing spray programmes across all the crop types."

Kevin says the team contributes to the wider horticultural industry.

"We offer some unique insights into current issues due to our representation in the field, with THRs working across multiple crops. Our technical knowledge puts us in a good position to help."

Research is still a major component of the group's work. Product trials are conducted in the main growing regions of New Zealand with vegetable trials being held around Pukekohe, subtropical trials in the Bay of Plenty, apples and grape trials in Hawke's Bay as well as in Blenheim and Nelson. Further south, Canterbury hosts vegetable and arable crop trials.

As Kevin explains, these trials, "look at new product solutions to help grow the industry and allow us to gain a good understanding of how a product will fit into an integrated production system."

For product manufacturers, the Fruitfed Supplies team offer a unique understanding of the marketplace. "We're a reliable operator for manufacturers to conduct trials. With our THRs meeting growers every day, we understand the current issues, and this knowledge allows us to help manufacturers form meaningful research programmes and identify suitable trial sites," says Kevin.

Currently, the R&D team is trialling fungicides for disease control, herbicides for weed control while also focusing on biological products. As Kevin says, "in addition to insect pest, disease and weed control products, we have a strong focus on trialling biostimulants which increase crop productivity and improve plant recovery."

To communicate the outcomes of R&D trials to Fruitfed Supplies clients, the Technical Team travels the country to hold crop – specific meetings. These meetings provide growers with an overview of what has shaped the last season for a crop, what new products are arriving on the market and how they may fit into the growers' own production systems."

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YOUR INDUSTRY

ACROSS THE SECTOR – ACROSS THE COUNTRY

FROM ELITE SCHOOL TO ELITE SOILS: A WINNING YOUNG HORTICULTURIST

Gemma Carroll : Potatoes NZ Inc communications and engagement officer

In May this year, 25-year-old Sarah Dobson became the first regional finalist for the 2022 Young Grower of the Year competition.

Sarah is an environment and sustainability technician at A S Wilcox and will next represent the region at the national competition in September.

For the Pukekohe competition contestants completed modules in marketing, compliance, pest and disease identification, safe tractor driving, health and safety, soil and fertilisers, irrigation, and quality control.

The competition was tight and strong, with no obvious stand-out in Sarah's mind, but for those of us from the NZ Potato Industry in attendance on the awards night, we were fairly sure of her abilities when we witnessed her beautifully crafted speech at the start of the evening. Sarah is a humble, intelligent and talented communicator.

For Sarah an interest in horticulture was not an obvious choice, despite her proximity to the food bowl of Pukekohe, growing up on a lifestyle block where her parents had a vegetable garden and home kill meat, as well as an aunty with a kiwifruit orchard. The commercial cropping areas she passed

Bryan Hart and Sarah Dobson

by on the school bus rides to ACG Strathallan didn't particularly catch her eye, and she was focused on her love of science in the classroom. She was also interested in climate change impacts, food security, and overseas aid work, but horticulture was not a subject offered at her school.

She was fortunate enough to meet an external careers advisor who suggested she consider agriculture as a pathway, so armed with a scholarship to Massey, as well as support from A S Wilcox, she completed a BSc in Agricultural Science with a minor in Horticulture, followed by her Master of Science in Horticultural Science.

Her boots-on-the-ground experience began with a placement at her aunt's orchard, then subsequently at A S Wilcox vegetables in their potato paddocks, digging spuds. Wilcox started growing potatoes and onions in the fertile volcanic Pukekohe soils in the early 1930s. They now operate in four regions: Northland, Pukekohe, Matamata and Ohakune, with 230 staff nationwide.

Sarah feels a good connection with the Wilcox team and her manager, Bryan Hart. Two years ago, they offered her a newly established role of Environment and Sustainability Technician, an opportunity she couldn't turn down as it matched her values so clearly. The company purpose of A S Wilcox is 'Growing healthy communities from the ground up', offering a meaningful culture for the team.

Her work involves managing farm plans, environmental improvement practices, compliance, trial work, and internal sensory testing. She has been able to design and develop her role because it was new, and she has brought multiple field activities under one hat.

> **Sarah feels a good connection with the Wilcox team and her manager, Bryan Hart**

In Sarah's mind, one of the biggest challenges for growers is keeping abreast of the changing compliance landscape and regulations. It means she needs to keep her programme moving forward, and be open to constant change, using the New Zealand Good Agricultural Practice (NZGAP) Environmental Management System (EMS) Add-on template as a starting point.

Wilcox has also started their internal sustainability development which embraces the pillars of People, Planet, Productivity, and Community. Their 'Grow 4 Good' programme encapsulates all these sustainability directions. An upcoming innovation is the scoping of a solar install project for their packhouse.

> **Sarah wants students to know that if they love science, they can connect it to horticulture and a world of opportunity can open up for careers**

Wilcox is looking at sustainability from a Best Management Practices perspective and not just to meet compliance. They see sustainability as an opportunity for business improvement. This includes social sustainability, which incorporates both People meaning staff and other personnel, as well as Community which holds the space for their wider families, customers, neighbourhoods and other stakeholders. As a result, staff tenure improves because they feel there is meaning in their work.

There are many issues facing vegetable growers in the region, which Potatoes NZ has had conveyed to us across all our growing regions: labour, seasonal staff, land availability, input costs and compliance costs.

Likewise, the barriers to entering the sector are felt too, with potential next generation talent unaware of the opportunities, the diversity of roles, the technology to support flexible working at times, but also a new

generation of workers who expect a good work-life balance and may not be attracted to the seasonal peaks. It begs the question – how do employers ensure those peaks are balanced by some other benefit for their teams?

Sarah wants students to know that if they love science, they can connect it to horticulture and a world of opportunity can open up for careers, but she also worries that there may not be enough specialised horticulture teachers available to support a renewed interest. For secondary students at schools that don't offer horticulture as a subject, the Gateway programme is often the only way students can get exposure to horticulture before leaving high school, and they first need to know about it before requesting an industry placement for the programme.

Bryan Hart can remember he had 300 students in his first year of Horticultural Science in the 1980s, whereas Sarah thinks she had less than 20 in her third year of horticulture. This emphasises the importance of advocating and creating career pathways to retain young people in the industry.

Potatoes NZ strongly feels that young people must play a key role in the future sustainability of our food security in Aotearoa. Students can access free registration to our Canterbury National Conference this year.

Despite the challenges and pressures facing the sector, Sarah truly enjoys supporting growers and quietly admits she could see herself as a future leader.

You will hear more from Sarah at the Potatoes NZ conference at the end of August when she speaks as part of our Sustainability Champions session on day two.

Register for the conference at
http://potatoesnzconference.nz/

Sarah's winning speech from May 2022 on the topic of New Zealand horticulture in five years' time:

I thought it might be interesting to consider what life could look like for an onion grower in 2027 – let's call him Brent.

It's the end of a long and hot onion season – there's been three weeks of sunny skies, all days over 30°C. Yields were down 30 percent on the older lines as Brent couldn't get enough water on them – he'd reached his consent capacity. Fortunately, his newer varieties withstood the heat much better.

Brent sits down to check his emails and sees his residue results come in. No residues – what a relief! His European customers now require zero residues, so this result means his onions are cleared for export. Glyphosate's also been banned – while the farm's less tidy these days, all paddocks have flowering borders to encourage beneficials.

While Brent is at his desk, he files his first emissions return for carbon credits. Three years ago, he planted up his gullies. Even though it cost a lot, he needed to get most of it done anyway for his Freshwater Farm Plan. Plus, he's taken some great photos for his annual sustainability report.

Brent thinks back to five years ago – sure, there's more compliance, stricter regulation, but he knows his onions are safer for consumers, he feels resilient in the face of climate change, and his growing operation is environmentally sustainable – he is ready for the next five years.

NEW MOBILE VEGETABLE WASHING SYSTEM RECYCLES 95 PERCENT OF THE WATER FOR CARROT FARMER

Bonnie Flaws

Washed carrots loaded up for transportation to the McCain's processing plant

Hugh Ritchie – Hawke's Bay cropper, sheep and beef farmer, and Horticulture New Zealand board member – has used Kiwi ingenuity alongside European technology to recycle vast amounts of water in his mobile, post-harvest carrot washing operation, which can be moved from paddock to paddock.

Previously, after harvesting his carrots, Hugh would ship truckloads of carrots to a plant in Hastings where they would get washed. From there the carrots would be shipped to McCain's processing plant and the sediment that came off in the washing process was trucked back to the farm to be put back on the paddock.

Now, using high tech equipment from the Netherlands, including a water recycling unit, a modified 40-foot shipping container for water storage as well as an old potato tumbler from McCain's, Hugh retains the majority of water used during the washing process. He also siphons off the dirt sediment into ponds to be reapplied to the paddock once any water has drained away.

"I knew we had to do something better than just letting the water run away. The flume uses about 20 cubic metres of water an hour to keep it flushed and fresh and then we are probably using 10 litres a second through the sprays."

The washer could be fed with new water that then runs off, or as Hugh has done, recycled to use throughout the harvest.

> **"I knew we had to do something better than just letting the water run away. The flume uses about 20 cubic metres of water an hour to keep it flushed and fresh and then we are probably using 10 litres a second through the sprays**

"Because it is mobile, we can take it to the paddock where the carrots are being harvested. You can see all the dirt coming out. Rather than carting it to Hastings and then bringing it all back again, we can do it in the paddock and leave the dirt where the dirt needs to be."

Hugh Ritchie has put together a washing system that uses 95 percent less water

When the flume was imported from Europe during Covid-19, Hugh was told that it was a low water use unit.

"Well, I suppose 20 cubic metres an hour is low water use if other things use 50 cubic metres an hour. But what we used was not even close, so we had all sorts of blockages and problems. So we then had to go to a much higher water use to keep that all flushed. The pumps don't like pumping high dirt content, even just the dirty silty water.

"So all of the water comes out of the sprays and comes out of the top through a geotech cloth and all the organic matter gets taken out and put on the side."

> **"So that means the water can last up to two to three weeks, without changing it. All the water that we get to re-use flows into gutters that are up high, and everything below that is a settling area**

Hugh's number eight wire mentality came in handy when he decided to modify the shipping container that the equipment had arrived in to work as the water storage tank, rather than import one. The tank is operated by computer which controls a complex system of augers and siphons, and times the release of silt into the collection ponds.

The water collects in the tank and gets pumped through for re-use. Improvements to the pumps are ongoing so that they can handle the volume of silt build-up without running out of oomph.

"So that means the water can last up to two to three weeks, without changing it. All the water that we get to re-use flows into gutters that are up high, and everything below that is a settling area," Hugh says.

How much water is he saving? Hugh calculates that without the recycling system he would be using about 500,000 litres a day, but now uses just 25,000 litres (five percent).

"We don't need a consent with that. There is no discharge and it can be mobile."

> **"The water collects in the tank and gets pumped through for re-use. Improvements to the pumps are ongoing so that they can handle the volume of silt build-up without running out of oomph**

The washing set-up has probably set him back $400,000 all up. And over the past few seasons, with continued improvements being made along the way, Hugh estimates the capital outlay will have now been covered by the fees he has saved for washing.

DOWNSIZING CROPS, BUT PASSION FOR TOMATOES REMAINS STRONG

Photography: Helena O'Neill

Eddie Paul checks tomato plants in the plastic glasshouse at the Te Puna property near Tauranga

With three decades of growing tomatoes under their belts, Te Puna couple Eddie and Lyn are a familiar fixture at Tauranga Farmers' Market. HELENA O'NEILL talks to Lyn about scaling back their commercial operation into a more modest business while remaining enthusiastic about growing fresh produce in the Bay of Plenty.

A short drive from busy Tauranga is the rural paradise of Te Puna. Here on a half-hectare plot overlooking the bay, the Pauls have spent the past 30 years growing tomatoes, cucumbers, and a few other vegetables for the domestic market.

Lyn says the couple faced a steep learning curve starting out, but don't regret taking up horticulture.

"We were dairy farmers. Ed had an uncle who grew tomatoes in Otahuhu during the 1950s until the early 1970s. Ed's father was a great gardener and Ed just thought that growing tomatoes might be a good thing to do."

To help make ends meet as they set up their tomato operation, Lyn returned to nursing for a "short time," but ended up spending 20 years nursing while Eddie ran the horticulture business.

"We physically built the glasshouses ourselves. We bought a Faber glasshouse which arrived on the back of a big truck tied up in bundles. A couple of guys came down and stayed for a couple of days in the pouring rain and showed us how to build it."

"We grew in the soil of course, and we found a consultant, but it was a really steep learning curve. It was trial and error, but we did okay. The first crop we grew were cucumbers because we thought we were too late for the tomato season. Our first crop of tomatoes we grew in March 1991. We grew in the ground and then we changed to sawdust bags before changing to rockwool in the early 2000s."

The couple started out selling to Turners and Growers, before changing to a broker. They also started at the Tauranga Farmers' Market in 2007, selling two-thirds to a broker and a third to the market. Slowly the farmers' market took over and in 2009 they stopped selling to a broker and went solely to the market.

"We're very small for a tomato grower. In total we have three glasshouses – the big Faber is 1000m2, a smaller plastic house that is about 700m2, and then a little glasshouse that we don't grow in anymore. We pulled out that crop just before Covid-19 started."

While it's easier to grow plants under glass, the Pauls are growing in the plastic house because it's smaller and easier to manage for just the two of them.

> "Ed over the years has become really good at looking at the plants – he can read the plants. It's observation I think

"We spray as little as we can, and we use organic sprays. Our biggest problems are botrytis of course, but also whitefly. We're always on the lookout for tomato potato psyllid (TPP), but we don't have huge problems with it. The past couple of years we've sprayed quite minimally. I think that's down to good luck. We're very clean and very fussy in the glasshouse. Being observant and getting on top of things before they get out of hand really does pay off."

And the secret to growing flavoursome tomatoes?

"Feed them. We do all the things that you're supposed to do like crop management and registration – measuring the plant, the length of leaves, and all the rest of it. We mix all our own feeds ourselves and when we get into trouble, we ring someone and ask them. Mostly I think it's the way we feed them. We tend to feed them quite heavily. Our tomatoes do tend to be on the bigger side.

"Ed over the years has become really good at looking at the plants – he can read the plants. It's observation I think."

This year they have reduced the number of plants from 3000 to 700 but hope that they will plant more next year if their health allows.

"We usually grow capsicums, Lebanese and telegraph cucumbers, eggplants and beans. We've cut some of that out, we'll grow some cucumbers, but we won't grow the capsicums and eggplants this year."

The couple grow cherry, baby Roma, Roma (low acid), and medium table tomatoes. Lyn says people are always after sauce tomatoes too.

"We were lucky because when Covid-19 came, we had just planted our crops, so it didn't really affect us. For the next shutdown, Farmers' Markets New Zealand had gone into bat with the Ministry for Primary Industries (MPI) and we [Tauranga Farmers' Market] became a retail business and could remain open under the same rules as retailers. We voted not to be a vaccinated market, but you had to wear a mask and were limited with visitor numbers for a couple of weeks."

Selling their produce at the local farmers' market is a great social outing for the couple, but also an effective way to get feedback from their customers.

"The biggest thing is being able to talk to our customers about our produce and meeting their needs. We pre-bag a lot of our tomatoes because our stall is so busy, we don't have time to sell loose. We get good feedback from customers about the product whether it didn't keep last week, so it's a good quality control on your product as well. You don't get that from your broker, you just get told it didn't sell," Lyn says.

"We also have people come back giving us jars of chutney and recipes that they use. Along with a few hints, there is quite a bit of discussion of how to use them."

And more than 30 years later when others have taken up retirement, Lyn says she and Eddie still enjoy growing their crops.

"It's just because we like it. There's always that challenge to have the perfect crop. It always starts out perfect and then something happens. Every season he says this is my last year. And then we end up planting," she laughs.

Tomato plants in flower and beginning to fruit

WORKSHOP TACKLES BIG ISSUES FOR COVERED CROP AND TOMATO GROWERS

Glenys Christian and Dinah Cohen

On a grey day in May, undercover crop growers gathered in Pukekohe and online to hear about some of the main issues facing their industry as well as updates on key projects supported by TomatoesNZ and Vegetables NZ.

Barry O'Neil, TomatoesNZ and Horticulture New Zealand chair, opened the workshop by saying, "There have been a lot of challenges and I've never seen a season like this. It's been really, really tough."

Biosecurity

Biosecurity is an issue all growers face with the threat of an incursion always a possibility. Tomato growers have been dealing with the pepino mosaic virus (PepMV), which was found in five sites around Auckland in 2021. Jeremy Thompson, Ministry for Primary Industries' (MPI) head virologist, has led testing for this virus. He confirmed that when first identified in New Zealand, MPI was able to call on a lot of overseas knowledge as PepMV has been around since the 1970s, when it was first identified in Peru. It then spread to Europe in the late 1990s to early 2000s, and into the United States and South Africa in 2010. Full genome testing showed that one Auckland greenhouse has the CH2 strain (mild) while the other five have the PVX (Potato Virus X) co-infection.

Jeremy is in touch with a Belgian company about testing the effectiveness of a vaccine, which has been used in Canada and the United States, but approval for use in New Zealand would be some time away even if the trials were successful. The good news is that PepMV affects the plant mostly, rather than the fruit, and strict hygiene regimes can limit the spread.

The survival of viruses in soil when infected plants are composted is another project that MPI is looking to co-fund with interested parties. Further updates will be given in later issues of this magazine.

Seeds are a key vehicle for viruses to travel into the country. Herman van der Gulik, Enza Zaden sales manager, detailed some of the strict measures being taken to make sure this doesn't happen.

"Prevention is better than a cure so seed testing is commonplace to prevent outbreaks. Unfortunately, onshore and offshore testing creates delays, so growers need to plan ahead and order seeds with plenty of notice.

"Buying seeds from reputable sources is also key. Online importing of seeds has no assurance that testing has happened."

Lex Dillon from *A Lighter Touch* spoke about research carried out into the use of biocontrols. An article on this topic will appear in the next *NZGrower*.

Energy and decarbonisation

The workshop then turned its attention to the topic of energy and decarbonisation. With most greenhouses heating for at least five months of the year, many small to medium growers are at a loss as to how to manage the rising price of fuel, the added cost of the Emissions Trading Scheme (ETS) payable for fossil fuels like coal, and the push by the government to decarbonise.

Insa Errey, from the Energy Efficiency and Conservation Authority (EECA), has been working closely with both TomatoesNZ and Vegetables NZ over the past 12 months to produce a range of tools for growers to make sure their energy use is as efficient as possible. EECA now has a dedicated page on its website for the undercover crop growing industry, where all these tools can be found.

> "Prevention is better than a cure so seed testing is commonplace to prevent outbreaks. Unfortunately, onshore and offshore testing creates delays, so growers need to plan ahead and order seeds with plenty of notice

Two growers who have been part of trialing these tools were able to share their experience at the workshop.

Canterbury grower, Rob Lindsay, warns that there's no silver bullet when it comes to reducing emissions. Instead, solutions have to be matched to individual sites, and involve many factors including the energy requirements of the crop grown and fuel source availability – both now and into the future.

In 2018, after a career involved in a range of horticultural enterprises, Rob joined fellow Canterbury grower and

Rob Lindsay in one of his greenhouses

good friend, Allen Lim, to grow telegraph cucumbers under plastic and glass all year round. The old coal-fired boilers were upgraded recently to use re-refined oil which burns much cleaner. But Rob realised this fuel source has a limited lifespan so he's investigating other options.

Rob started to look for ways to improve energy efficiency 18 months ago when they tried to identify where the biggest energy losses were. This resulted in him looking at their screens, boiler efficiency and linking the temperature in the greenhouses to the amount of sun at any given time.

The efficiency of the existing screens was improved to minimise energy loss through the greenhouse roof. The screen fabric used has an energy rating of 47 percent thermal insulation, with only seven percent shading.

"The screens are primarily used to prevent heat loss, so by making small changes to set points within the climate software, we have seen large changes in greenhouse climate."

Next, Rob looked at the efficiency of the boiler, asking why run the boiler at a high setpoint on a sunny day? Bringing in a consultant, he quickly discovered the boiler controller

could be linked to an external temperature input.

"We manufactured our own solar sensor using a cheap temperature sensor inside a milk bottle pray-painted black."

This replicates temperatures inside the greenhouses on a sunny day, and so lowers the boiler heating setpoint. The total cost came to less than $200.

Finally, Rob looked at the idea of linking the greenhouse temperature to the incoming solar radiation, as detailed in *Growing by Plant Empowerment*, which links plant growth to the incoming sunlight.

"Low sunlight means less incoming energy for photosynthesis, therefore we need to slow down the plants' energy usage, by dropping the 24-hour average greenhouse temperature."

The result was a saving of ten percent in energy costs in year one and a further six percent in year two.

> **"We manufactured our own solar sensor using a cheap temperature sensor inside a milk bottle spray-painted black**

Energy down, production up

One of the biggest surprises in the journey so far is that not only have they managed to reduce their energy use and save money, but production has increased!

Rob believes further optimisation of energy use can still be achieved. He's looking forward to getting an energy audit carried out, with further projects on reducing energy demand involving screens and dehumidification likely to follow. And when it comes to fuel switching from the current waste oil fueled boiler, Rob's convinced there's no point switching like for like unless optimisation is very much part of that move.

Chipper alternative

Leanne Roberts' family have been growing leafy greens and herbs hydroponically at their Marlborough property, Thymebank, for almost ten years, and she too shared their decarbonisation experiences. They were using a coal-fired boiler to heat a covered area of 5500 square metres.

They were using a
coal-fired boiler
to heat a covered area of
5500 square metres

Leanne acknowledged that she is lucky to have had a high spec boiler that was relatively easy to convert, and family members who were handy with tools and full of ingenuity.

They looked long and hard at switching to the use of waste oil but realised it wasn't sustainable, so they also looked into wood pellets or chips but were concerned about the vulnerability of their business due to supply issues. "As a result, we set up our own cottage industry with an arborist, so we have our own supply of wood chip. This is a mutually beneficial agreement as the arborist is happy to have a means of disposing of their waste."

Getting resource consent has been their biggest challenge throughout the whole process. As for costs, they were looking at $250,000 for a boiler conversion to other fuel sources, but as they were able to make many of the changes themselves, the actual cost has been about a tenth of that amount.

"That was really surprising, and the ongoing costs were also a lot lower."

While the boiler use is slightly higher when it is burning wood compared with coal, it isn't as high as they had thought it would be.

> **"As a result, we set up our own cottage industry with an arborist, so we have our own supply of wood chip. This is a mutually beneficial agreement as the arborist is happy to have a means of disposing of their waste**

Voicing grower concerns

Finally, growers were able to voice their concerns to two National Party politicians, spokesperson for horticulture Tim van de Molen, and energy spokesperson Stuart Smith. Major concerns are the rising costs of production, including the effect of increasing fuel prices on transportation, the shortage of labour in all areas, and the issue of food security if New Zealand growers can no longer afford to produce fresh vegetables.

John Murphy, Vegetables New Zealand chair, closed the workshop by promising to continue discussions with the politicians of both main parties so that the growers can try to influence policy. ●

If you missed the workshop, a recording and copies of presentations are available. Email **Dinah.cohen@hortnz.co.nz**

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THE LEGACY OF PETER FALLOON

Heather Chalmers

The family of renowned asparagus breeder Peter Falloon is finding solace in continuing his legacy.

"Peter dedicated his life to a very special crop and it is important that we keep the momentum going," says his wife Linda following Peter's death last year.

Operating Aspara Pacific, the only asparagus breeding programme in the southern hemisphere, Peter commercially released his own distinctive varieties including a world-first *Phytophthora* tolerant asparagus.

While the rest of the southern hemisphere grows virtually the same variety (UC 157) from California, Peter's legacy means that New Zealand has asparagus bred to suit local conditions, with its own recognised taste and look.

As Peter was the main driver for the breeding work, as well as consulting internationally, Linda and their son Matthew are now having to take on a more high-profile role.

"We are reassessing the business and where we want to put our energies. In the past we relied on Dad to set the direction," says Matthew, a physiotherapist who joined the family business in 2016 when his father first became unwell.

Aspara Pacific, established by Peter and Linda in 1990, has a plant tissue culture laboratory and four 'level two' quarantine tunnel houses near Rolleston, south of Christchurch.

Asparagus breeding trials are carried out on a four-hectare block beside the house, while seed production is done on another 20-ha block nearby. The seed is then grown in a crown nursery to produce rootstock, which is lifted for sale to commercial growers and home gardeners. The family also have a one-hectare block growing fresh asparagus spears to sell in spring at the gate and farmers' markets.

Aspara Pacific also plays a key role in the New Zealand seed potato industry as a main supplier of high health stock. It grows tissue culture plantlets in glasshouses to produce mini tubers, which are used by seed potato growers for multiplication.

The last season has been challenging, not just for the Falloons, but the wider asparagus industry with the Covid-19 pandemic presenting a raft of obstacles. Hitting growers hard have been virtually no exports because of a lack of airfreight, labour shortages, increased costs of production, and an extended lockdown in Auckland shutting restaurants during the peak asparagus harvest last spring.

Aspara Pacific founder, the late Peter Falloon. His asparagus breeding programme is being continued by his family

"Hopefully this season, things will be more positive, with restaurants and possibly more tourists back. If air travel gets going again, exports can restart," says Matthew.

Son, Matthew Falloon and his mother, Linda, check the rootstock of asparagus plants in their crown nursery

Overall, the area in asparagus production is contracting, with the industry made up of big growers selling to supermarkets and wholesalers, with some export and smaller growers earning a living from gate sales and farmers' markets.

"There are not the packhouses that pack for multiple growers as in the past. The golden era of exporting to Japan in the 1990s seems a long time ago."

Aspara Pacific has three of its varieties available for commercial sale this season, Pacific Challenger, the world's first Phytophthora tolerant asparagus variety, Pacific Endeavour, a slightly earlier variety and Pacific Purple, named for its distinctive dark purple spears.

Matthew says that his father's focus was initially more science-based and always about improving the New Zealand industry. "Unfortunately, with the New Zealand industry not increasing in size, it is not sustainable to just concentrate on the domestic market, so we are looking to increase exports of seed.

"We can produce a quantity of good seed, so now we need to start selling it more to the world."

With travel restrictions easing, Matthew flew to Australia in April, receiving a good response from growers there.

A new variety, Pacific Summit, is in production, with the Falloons putting in a demonstration block to show growers.

"The spear looks great and has a tight head. The growth of the trial block is good, but this variety is difficult to get seed from," Linda says.

An early variety, Summit does well in warm, dry conditions. Matthew says the market for this would probably be more overseas in Mexico and Peru, or warmer districts of New Zealand like Hawke's Bay. "As it is an early variety it suits the early market when prices are high, but it is not so suited to the South Island."

Trials of Aspara Pacific varieties are being carried out around the world, including Ukraine where trials are now on hold because of the war.

> **"Peter dedicated his life to a very special crop and it is important that we keep the momentum going**

In mid-June, Matthew travelled to Spain for an international asparagus symposium, held every four years and previously always attended by Peter and Linda. The symposium included a presentation to acknowledge Peter's leadership and contribution to the international asparagus industry. Matthew chaired the session on plant pathology and pests of asparagus.

Matthew Falloon amongst the ferns of a new, early asparagus variety, Pacific Summit, which does well in warm, dry conditions

In early July, Matthew also presented a paper to United Kingdom asparagus growers on breeding for Phytophthora tolerant asparagus.

A fungal disease of asparagus in many countries, Phytophthora rot damages roots during wet and cool conditions, causing establishment failures and potentially reducing yields by more than 50 percent. While overseas breeding is focused on another fungus, *Fusarium*, Peter instead concentrated his efforts on Phytophthora.

Linda says that while growers in some countries would say they don't have a Phytophthora problem, "Peter said that the damage is done below the ground, so growers don't realise the effect it can have on reducing yields."

Matthew says growers will say that the difference between a dry and a wet season is five tonnes a hectare, with yields dropping from an average of eight to three tonnes in wetter years. "They don't appreciate that a lot of that is because of Phytophthora."

The Falloons dig up the crowns in late winter before they break dormancy, and store them in a chiller until they are ready to be distributed to buyers.

"The worst thing is for people to put the crowns in the ground too early in the season, as they will rot."

The best time to plant asparagus is when soil temperatures rise in spring. In the North Island this is from mid-September to mid-October, and in the South Island from early October.

As well-established plants can be productive for ten to 20 years, it is important they get a good start, Matthew says. Asparagus likes deep, free-draining soil, free from compaction layers. Asparagus takes time to establish, with a small harvest in the third season and full production not reached until the fifth season.

There is still a bit of mystery around asparagus production, Linda says. "A lot of people know asparagus but have no idea about how to grow it."

On a hot, north-westerly day in peak season, spears can jump out of the ground so fast they have to be picked twice in one day. "Spears are picked at 6am and by 2pm they need to be picked again. It's usually about Canterbury anniversary weekend (the second week in November)."

After Christmas, the plants are left to develop their fern so carbohydrates are returned to the root system in autumn.

"The consumer still gets so excited in spring when asparagus comes onto the shelves. People just love it, as it is a seasonal product, so we don't want to breed long shelf life into it," Linda says.

As Covid-19 restrictions meant gatherings were limited when Peter died in August 2021, a memorial service will be held later this year.

> **"The consumer still gets so excited in spring when asparagus comes onto the shelves. People just love it, as it is a seasonal product, so we don't want to breed long shelf life into it**

A former chairman of the New Zealand Asparagus Council and a former director on the Research and Innovation Board of Horticulture New Zealand, Peter published more than 100 scientific papers and popular articles on asparagus and advised asparagus growers in Australia, Asia, Europe and North and South America.

UNDERSTANDING THE THREAT OF FALL ARMYWORM IN NEW ZEALAND

Bonnie Flaws

After fall armyworm was found in Tauranga in March, primary sector partners have ramped up research to understand what level of threat the pest poses to production crops and native species, and how it should be managed going forward.

While there have not been any further finds in the region, fall armyworm larvae have been found on regrowth maize and corn crops on 21 properties in the Waikato, Auckland, Waitara, Taranaki and Gisborne.

The pest, in the right conditions, is capable of many successive cycles of reproduction and of reaching a critical mass that can wipe out a crop overnight – hence the military reference.

"It can be a really big problem in young corn if it gets into the whorl of the plant, effectively destroying it," says Process Vegetables New Zealand general manager, Richard Palmer.

Native to the Americas, fall armyworm *(Spodoptera frugiperda)* has been spreading across the globe inrecent years to Africa and Asia and was found in Australia in 2020. Biosecurity authorities have been aware for some time that wind could carry the pest over the Tasman, as the moths are known to be able to travel long distances.

The good news is that it's widely believed to be too cold in New Zealand for the pest to thrive. In order to reach the number of reproductive cycles required to go on the march, it needs a tropical climate.

The bad news is that fall armyworm has a taste for more than 350 plant species. In particular, it likes maize and corn, but also a wide variety of other production plants including those in the brassica and the nightshade families – tomatoes, potatoes, capsicums and aubergines, as well as asparagus, beans, peas, beetroot and lettuce.

> **"It can be a really big problem in young corn if it gets into the whorl of the plant, effectively destroying it**

A lot hangs on whether it can survive through the winter, as to whether it will become a problem for croppers and native plants, says Better Border Biosecurity (B3) director, David Teulon.The jury is still out on that," David says. "It is a tropical insect. If it is going to be a problem it will be in Northland. After winter we'll have a much better idea of where fall armyworm will overwinter in New Zealand."

B3 and the Ministry for Primary Industries (MPI) are ramping up research projects to understand the level of threat the worm might pose to the country, now that it has been found here. The pest is firmly established in Australia, which has chosen not to attempt an eradication programme.

2-3 lifecycles

Scientists think that the fall armyworm could have had two to three lifecycles since it arrived in New Zealand and it is unknown how long it has been here.

12 lifecycles

In warm climates, it can have up to 12 lifecycles in a season.

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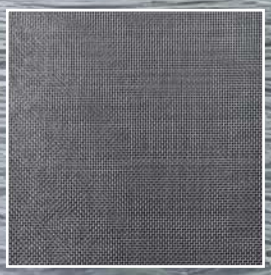

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Even if fall armyworm does not establish at this time, there is a strong likelihood that it will continue to threaten New Zealand, as it can continue to be blown across the Tasman Sea, David says.

"The key questions are where will it overwinter and how many generations will it have in one year? Everything hangs on that," says David. "It needs to get up to about four generations to become a problem. Now that it is here, we need to understand the potential for migration out of overwintering areas to other places."There is an assumption that it will survive in Northland reasonably well. This thing is known to fly a lot, large distances, and will probably fly out of Northland if there are appropriate wind currents. We are looking at that with Scion."

Biosecurity New Zealand director of readiness and response, John Walsh, says first and foremost, they are encouraging farmers and growers to keep a good look out on their properties.

"If they find it, we are helping them to figure out what to do about it. This can involve the removal of any crop in which it has been found, which has the effect of killing the worm. Or else spraying the crop with insecticide."

MPI is also working on information and advice for growers and gardeners, in the event fall armyworm is found on their property.

"That is quite a substantial piece of work – and that is not because we are assuming that the pest will establish here as a result of what has happened over the autumn, but because we know that we will continue to be vulnerable to reinvasions from Australia," says John.

Other research programmes include modelling around climate and risk – we could have a warmer winter and there are also micro-climates around the country; also, the risk posed to production plants and native plants and a surveillance programme for next spring and summer."We are not assuming it is going to be decimated around the country from frosts and cold weather. Maybe it will be, but we don't know. So we are working that through," John says.

Scientists think that the fall armyworm could have had two to three lifecycles since it arrived in New Zealand and it is unknown how long it has been here. In warm climates, it can have up to 12 lifecycles in a season.

> **"If they find it, we are helping them to figure out what to do about it. This can involve the removal of any crop in which it has been found, which has the effect of killing the worm**

"The belief is that we are not warm enough for it to have that number of lifecycles," says John. "But nevertheless we are treating it really seriously and we have an appropriately significant body of work on the go to understand the problem and to figure out how we are going to manage it going forward."

Native to the Americas, fall armyworm *(Spodoptera frugiperda)* has been spreading across the globe in recent years to Africa and Asia and was found in Australia in 2020

SNIFFING OUT NEW ZEALAND'S BLACK GOLD

Photography: Helena O'Neill

Maureen and Colin Binns of Te Puke Truffles show off some of this season's truffles harvested at their Paengaroa property in the Bay of Plenty

A truffle hunt. It's the closest thing to an edible treasure hunt, sniffing out and digging up a black delicacy with almost as much mystery surrounding it as a buried treasure. HELENA O'NEILL talks to Colin and Maureen Binns about the growing interest in New Zealand truffles.

On a lifestyle block at Paengaroa in the Bay of Plenty, dark clouds and showers of rain fail to deter over a dozen eager truffle tasters assembled for Te Puke Truffles' first hunt of the season. Decked out in sunglasses, gumboots and rain jackets, visitors listen attentively to Colin Binns' brief outline of New Zealand's truffle-growing history and the wealth of knowledge gained over the past 14 years.

"Secrecy has surrounded truffles for hundreds of years. Our aim is to get everyone in New Zealand to taste truffles. We're getting chefs here and hosting truffle hunts and sharing our knowledge," Colin says.

"We've only got 212 trees, we're quite a small truffière [truffle orchard] but boy, it keeps the two of us busy," Maureen adds.

After visiting truffières around the North Island the couple planted more than 200 oak and hazelnut trees in 2008.

Colin estimates about 50 tonnes of lime was added to the soil to bring up the pH (alkalinity) level before planting out the half-hectare truffière.

The first Périgord black truffles were found in 2015 and now the Binns are supplying restaurants and hosting truffle hunts during the harvest season.

"You always have concerns around how many truffles you've got and what sort of quality you're going to get," Maureen says.

"Two years ago, the aroma was fantastic, last year the aroma wasn't as strong. It depends on the climate, how much rain and how much cold you get [that season]. We can't change those things; all we can do is try to produce the best that we can.

"I get nervous if I worry too much, but I'm not going to worry because I know there are truffles there and I know that we've got a good dog that will find them."

The harvest season is eight-year-old Jed's time to shine.

The springer spaniel is a vital part of the Binns' truffle operation. Those gathered for the truffle hunt can testify to how swiftly Jed's nose can detect the aroma of a ripe truffle. Mere moments after being put to work, Jed has indicated, and Maureen has her own nose to the ground to verify her dog's find.

Truffle dog Jed examines one of the truffles he scented

Gently brushing a layer of soil away, Maureen struggles to detect the aroma. Jed's paws are called into action and after a brief dig, Maureen's nose is back to the soil and a few moments later what looks like a clump of dirt is nestled in the palm of her hand. Success! It's a truffle.

> **"Secrecy has surrounded truffles for hundreds of years. Our aim is to get everyone in New Zealand to taste truffles. We're getting chefs here and hosting truffle hunts and sharing our knowledge**

The couple used to contract a travelling truffle dog service to detect ripe truffles, but decided it would be best to train up their own dog in order to check the truffière regularly.

"The handler said the springer spaniel is a really nice dog, which they are, with a really good work ethic, good nose, and you can have them as a nice dog. I realised with the truffle season, every Friday, Saturday, Sunday (and an extra day sometimes) for June and July we have people booked and paid to come here, we must have a dog!"

Having their own truffle dog on site proved invaluable, with Jed regularly finding them every other day instead of relying on someone else to bring their dog to check sporadically. Last year the Binns decided they needed a backup dog as Jed grows older.

> **"Sam the spoodle is absolutely gorgeous. He's a naughty puppy, but he's absolutely lovely and not too big**

The New Zealand Truffle Association (NZTA) science advisor in Christchurch suggested a spoodle (spaniel poodle cross) since Maureen was hoping for a smaller dog.

"Sam the spoodle is absolutely gorgeous. He's a naughty puppy, but he's absolutely lovely and not too big."

When it comes to training, they hide small bits of truffle in film canisters with holes in the top and store the baits in the freezer.

"You then train the dog by concealing the baits. We use upside-down flowerpots and conceal the baits under some and get the dog to tell us where the aromas are. Little, fluffy truffle puppy has done really well. Now I'm

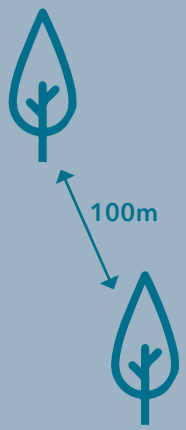
Périgord black truffles thrive best on sites with:

Free draining soils, preferably loamy soil with no more than 30 percent clay

A soil pH of 7.5 or higher

Around 700mm of rainfall

A good sunny aspect with high sunshine hours, to create an open, sunny woodland



At least 50m (preferably 100m) separation from any tree which may harbour competing ectomycorrhizal fungi is needed

just training him to scent which of the flowerpots has a truffle bait and sit down. I can't do that when the big dog is around, otherwise Jed [will] go around and knock the pots over and say there's all the baits."

As for the technical side of things: "We chose Périgord because they are the top quality that were available to be grown. It's a beautiful looking truffle."

> **"We use upside-down flowerpots and conceal the baits under some and get the dog to tell us where the aromas are. Little, fluffy truffle puppy has done really well. Now I'm just training him to scent which of the flowerpots has a truffle bait and sit down**

According to the NZTA, Périgord black truffles thrive best on sites with free draining soils, preferably loamy soil with no more than 30 percent clay. They need a soil pH of 7.5 or higher, around 700mm of rainfall, and a good sunny aspect with high sunshine hours, to create an open, sunny woodland. At least 50m (preferably 100m) separation from any tree which may harbour competing ectomycorrhizal fungi is needed.

Soil pH and rainfall can be artificially amended though the addition of lime and installation of irrigation, while the history of a site is also important. Sites with high concentrations of copper or phosphorus may be unsuitable unless levels can be reduced.

Bianchetto (Tuber borchii) truffles require similar conditions but are more tolerant of lower pH soils. Burgundy truffles (Tuber aestivum) prefer shaded woodland conditions and more moisture, as does Tuber brumale. All three will thrive in cooler conditions than the Périgord black.

At the end of each harvest season, it's straight into preparing for the next one. Maureen says there's a huge amount of pruning to be done before loosening the soil, reinoculating the trees, and testing then adjusting the pH levels if required.

"In November and December, the little babies start growing again so then you have to worry about the rainfall and how much grass growth there is – then Colin either mows or weed-eats between the trees. Come March

Kereru Brewing Company's selection of truffle beers

Scrambled eggs made with truffle-infused egg and garnished with truffle

and April you start worrying because some of them start popping their heads up through the soil and you need to cover them over again."

A cooling period is also needed to bring on ripening, she says.

"It's a little bit like dealing with leeks and parsnips. You actually need to have that chill to get the ripening, it's better when you get the frosts."

> **"You have your jar of eggs with your ripe truffle wrapped in a tissue inside the jar. After a day or 48 hours in the fridge the aroma has gone through the shell of the egg and egg white and into the yolk**

From late May onwards the couple begin hosting visitors until the season ends by early August.

"So many people are now learning about truffles and are able to taste them in a safe environment. It's a safe and relatively inexpensive tasting."

Having a good freezer stash of last season's truffles has been a lifesaver in the lead-up to this season as the Binns were asked to host a horde of visiting chefs, politicians and business leaders all before the season officially began in June. They prefer to give the truffles enough time in the ground to fully develop their aromas before digging them up, to ensure the best flavour.

"I'm still experimenting with how to use truffles. I microplaned lots last season when we were under Covid-19 restrictions and a lot of restaurants weren't open. So I can make up truffle butter, truffle ice cream, truffle anything with the truffles I froze from last season when they were ripe."

As part of the tours Maureen offers up truffle bread (made like garlic bread, only with truffle butter instead),as well as shortbread, macadamias, and popcorn using truffle butter or truffle salt. Her favourite way to showcase truffle is through scrambled eggs.

"You have your jar of eggs with your ripe truffle wrapped in a tissue inside the jar. After a day or 48 hours in the fridge the aroma has gone through the shell of the egg and egg white and into the yolk. The aroma coming off them once you've beaten the eggs up is amazing. Then I slice or microplane some truffle on top.

> **"So many people are now learning about truffles and are able to taste them in a safe environment. It's a safe and relatively inexpensive tasting**

"On the truffle hunts I overdo the aroma and flavour a wee bit as some people don't have a very sensitive sense of taste."

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Périgord black truffles

The Binns also supply truffles to a brewery in Upper Hutt and are chuffed with the results.

Kereru Brewing Company chief executive and head brewer Chris Mills says the idea to use truffles in beer came about when Maureen's son said his mum who grows truffles was in town and asked if he wanted to meet her.

"I said yes! We had just racked our New Zealand Whisky Barrel-Aged Scotch Ale into a tank for packaging but had not produced any labels for the beer yet and basically found a way to add the truffles very late in the process. The result speaks for itself and is our Gilding the Lily Truffled NZ Whisky Barrel-Aged Scotch Ale."

> **"I think truffles work well in beers that benefit from the additional complexities of mouthfeel and flavour**

Chris says the beers are some of his company's most highly rated.

"I think truffles work well in beers that benefit from the additional complexities of mouthfeel and flavour. Black truffles meld nicely with the malt and oak with notes of sherried milk chocolate and present a creaminess to the palate. The truffle integrates even better over time. The result is subtle but lifts the beer to a whole new level." And it's only the beginning of his plans for incorporating truffles into Kereru's brews.

"We are exploring other ways to work with truffles and while the NZ Whisky Barrel-Aged editions are very limited, we are working with them in Belgian-style dark ales where the malt and yeast character complements the addition of truffles."

A brief history of truffles in New Zealand

In 1985 Ian Hall began research on the Périgord black truffle at Invermay Agricultural Centre near Dunedin after first hearing of truffle cultivation research in France. In 1987 the first batch of New Zealand produced Périgord black truffle infected seedlings was planted in two North Otago truffières. Over the next few years, more truffle-inoculated seedlings were planted in other regions around New Zealand.

The first Périgord black truffles were found in a Gisborne truffière in 1993, five years after planting. Production of larger quantities in this truffière began three years later. In 1991 growers formed the New Zealand Truffle Association (NZTA). In 2002, truffles were made a recognised product group under the NZ Horticultural Export Authority, requiring all exports of truffles to be licensed.

The most common host trees for truffles in New Zealand are English and evergreen oaks, hazels, and some species of pine. A thriving industry now produces commercial quantities of extremely high quality:

- Périgord black truffle (*Tuber melanosporum*)
- Burgundy truffle (*Tuber aestivum* syn. *uncinatum)*
- Bianchetto truffle (*Tuber borchii*)
- Winter black truffle (*Tuber brumale*)

Truffles are grown throughout New Zealand except for the sub-tropical Far North and very wet West Coast of the South Island. Truffières (truffle orchards) have been planted from Whangarei to Southland, but there are larger clusters of growers in the Canterbury and Bay of Plenty regions. Bianchetto and Burgundy truffles can tolerate cooler climates than the Périgord black truffle, which prefers plenty of sun and warmth.

Apprenticeship funding a boost

The announcement of continued government financial support for apprentices will help the primary sector attract and train the thousands of new people needed, Primary ITO chief executive Nigel Philpott says.

Until the end of 2023, employers will be eligible for $500 a month for each first and second-year apprentice. The support comes from the Government's Apprenticeship Boost scheme, which has been extended until the end of 2023.

Nigel says the announcement is very welcome for employers. "At Primary ITO, we've seen massive growth in apprenticeship numbers since the Apprenticeship Boost was launched at the start of the Covid-19 pandemic.

"The growth we've had shows that the cost of training was a barrier for employers and prospective apprentices. It is fantastic to see that recognised by extending the financial support.

Primary ITO has over 20,000 learners in total, with nearly 8,000 of them doing full New Zealand Apprenticeships. Training for horticulture production has remained strong in 2022 with around 800 people enrolled in apprenticeships and training across crop, fruit and vegetable production and post-harvest.

"Apprenticeships are becoming an increasingly important feature of the primary sector," says Nigel.

"In future years we will see the growing pipeline of apprentices graduating, becoming industry leaders and taking on their own apprentices. The investment going in is extremely welcome now when employers are crying out for skilled people."

Primary ITO learners are also currently benefiting from the Government's Targeted Training and Apprenticeships Fund, which is paying nearly all training fees until the end of 2022.

For more information about government support available, visit primaryito.ac.nz

How your industry steers Primary ITO training

From onions and asparagus, to tomatoes, berries and apples, a group of horticulture production experts are meeting several times a year to make sure growers across New Zealand can access the type of training they need.

Primary ITO's Production Horticulture Industry Partnership Group (IPG) members are the voice of industry to steer how Primary ITO supports training and develops training programmes for the sector.

They are responsible for knowing what skills industry needs and working with Primary ITO on the best ways for people to gain those skills – whether that's through an apprenticeship, a programme, or a one-off "micro-credential", aimed at a specific set of workplace skills like operating a tractor.

The group members are representatives of some of New Zealand's biggest growers as well as family-run operations.

If you would like to talk about what's needed in workplace training in the production horticulture sector, get in touch with the IPG Chair, Antony Heywood, on antony.heywood@hortnz.co.nz

Primary ITO
Rōpū Whakangungu Ahuwhenua Ahumahi

NEW PRESIDENT FOR THE PUKEKOHE VEGETABLE GROWERS' ASSOCIATION

Geoff Lewis

New PVGA president, Kirit Makan, is a third generation vegetable grower

Third generation grower, Kirit Makan, is the new president of the Pukekohe Vegetable Growers' Association (PVGA).

Kirit comes from a long line of vegetable growers. He is currently general manager of Naran Makan Ltd, a family growing business founded by his grandfather and father around Tuakau in the 1970s. Located on a 40-hectare plot of land in Pukekohe, the operation predominantly grows the Pukekohe Early Long Keeper onion variety, along with potatoes, crown and butternut pumpkin and leeks for the local markets. Approximately 95 percent of Naran Makan's onion crop is exported to Europe, Indonesia and the Pacific.

With labour short this year, the family's entire onion crop was harvested by machine with many family members being drafted to make up numbers.

This season has been relatively warm and dry which has affected potato yields due to the high number of small potatoes.

At the same time, input costs, in particular for fertiliser are rising and could double to about $2000 a tonne by the end of this year. The government's campaign to create greater competition between supermarkets is also likely to put further pressure on growers' returns, Kirit says.

"There is a lot of legislation coming our way. I find myself spending more time in the office dealing with compliance issues. We're fronting a lot of government and council issues, making submissions on legislation and engaging consultants on technical issues. We're trying to get the best results."

The previous three years haven't been easy for Kylie Faulkner, outgoing president and the PVGA team. They inherited the Waikato Regional Council's Plan Change 1 and the National Policy Statement for Highly Productive Land – a policy directive motivated by the progressive encroachment of urban sprawl in some of New Zealand's most productive horticultural areas.

PVGA has been working its way through Plan Change 1 for ten years, Kylie explains.

"We've had to submit so many times. The plan change is difficult because it's not just a plan change it's to do with a Treaty of Waitangi settlement. (The Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010) covering the Waikato and Waipa catchments.)

"We fought very hard during the hearings process to get the commissioners to understand what it is like at the grassroots level. We got a group of us together to ensure we got the right message across. When the document was more favourable other groups, like Dairy NZ, Beef + Lamb, and the Department of Conservation began appealing different parts of it. It's got different industry bodies against each other. Just today I have received 50 emails from different lawyers."

Kylie says the core problem is that the whole plan change is built around the use of Overseer, which is not the right tool to use.

> **"We fought very hard during the hearings process to get the commissioners to understand what it is like at the grassroots level**

"The disappointing thing is that no one knows what to do. It isn't at the Environment Court yet. It's a stalemate, there's no environmental gain. No one knows what to do, and in a year, it could all be thrown out."

Similarly, the National Policy Statement for Highly Productive Land could affect what land growers can use, particularly anything close to waterways, and the use of nitrogenous fertilisers. This could render some properties unusable for horticulture and effectively unsaleable as well.

"We're not against the National Policy Statement for Highly Productive Land but we want to make sure it does not result in perverse outcomes. We feel like we – growers – are not being listened to. If they don't get it right there will be serious implications. It needs to work with the national policy on water or we're up shit creek.

"The frightening thing is that it is all happening so fast. The thing for me is how can we continue to provide healthy, fresh food for New Zealand? We are a resilient lot but I'm very, very concerned about how far growers can be pushed."

To this end, Kylie is keen to keep the mental health and well-being of growers in view and has taken on help from rural support organisation Farmstrong.

"We want people to recognise what support there is available," she says.

PVGA has about 250 members and covers a growing area from Warkworth to Matamata.

TECHNICAL

THE LATEST INNOVATIONS AND IMPROVEMENTS

MONITORING WINS OVER LEACHING MODEL

Sustainable Vegetable Systems

Andrew Barber and Henry Stenning

Sustainable Vegetable Systems (SVS) – Progress update

The Sustainable Vegetable Systems (SVS) programme continues to progress on all fronts with an ever-growing data set to support growers' nitrogen decisions. Analysing, presenting and incorporating this into the nitrogen model and tool is currently a central focus of the programme.

Trials – A final crop of ryegrass is to be planted in three of the four intensive trial rotations. The other rotation is entering cauliflower before it too is sown with a final ryegrass crop. Analysis of the crop nitrogen uptake and concentrations from the previous crop harvests is underway for incorporation into the plant-nitrogen model. Work is also underway on understanding the drivers of leaching events observed so far in the trials, and on the impact that nitrogen application rates and crop residue breakdown has on soil mineral N.

Regional monitoring – Regional sampling continues on a monthly basis, with most sites having had their summer crops harvested, and at some sites new crops have been planted. In addition, a winter potato crop will be sampled alongside one of the existing sites to fill a crop gap. Additional pre-harvest biomass sampling is continuing to increase the data available on crop yields and nitrogen content. Site reports on mineral N have been distributed to growers and monitors, and crop nitrogen budgets have been drafted using the sampled biomass data.

Andrew Barber and Henry Stenning

Model development – A working prototype (N-Sight) has been developed. This will continue to evolve into the farmer facing tool.

Dissemination – Preparation for a series of three videos is underway. These videos include a project overview, a look at the monitoring sites and the nitrogen cycle, and a science story – following the process from trial site to laboratory to data modeller.

N-Sight

Perhaps the most exciting development for the project is the work being done on the prototype farmer facing tool – N-Sight. Examples of the types of outputs generated by the tool are shown in Figure 1, though it should be noted that this tool is very much a work in progress and will go through several iterations before being released to end users. There is currently a lot of discussion about the different ways the tool could be used, including stand-alone and open source so it can be integrated into other providers' tools.

The tool currently takes inputs for the current crop, the previous crop, and the subsequent crop. These inputs include planting and harvesting dates, harvest stage, yield, initial fertiliser applied, and quantity and treatment of crop residues. Users can also input soil nitrogen test values, as well as the number of post-planting fertiliser applications they plan to make. The tool will then calculate the quantity of nitrogen to apply and the approximate dates to apply it on, in order to match the applied nitrogen as closely as possible with crop demand.

It is recognised that building a tool with lots of inputs will not result in the most user-friendly experience, so the programme is aiming to strike a balance as far as possible between accuracy and useability. The tool needs to function with minimal inputs yet allow those growers that want to tune the tool more accurately to their conditions the ability to do so.

The SVS tool will not model N leaching. This is extremely complex, with an enormous number of inputs and assumptions which build upon each other increasing the uncertainty. The leaching number also becomes the focus when it is more productive to direct time and energy towards better understanding the nitrogen flows that we do have more control over, which in turn will optimise nitrogen fertiliser applications.

Nevertheless, nitrogen leaching is a reality that growers need to account for. Simply saying that it is too hard to model doesn't help anyone. Therefore, the alternative requires soil nitrogen testing.

While a model could estimate the impact of a 100 mm rainfall event on soil mineral nitrogen levels, it is a massive leap of faith to have confidencein what that model is telling you. A representative soil N test (and of course what is 'representative' is up for debate) can be used instead as

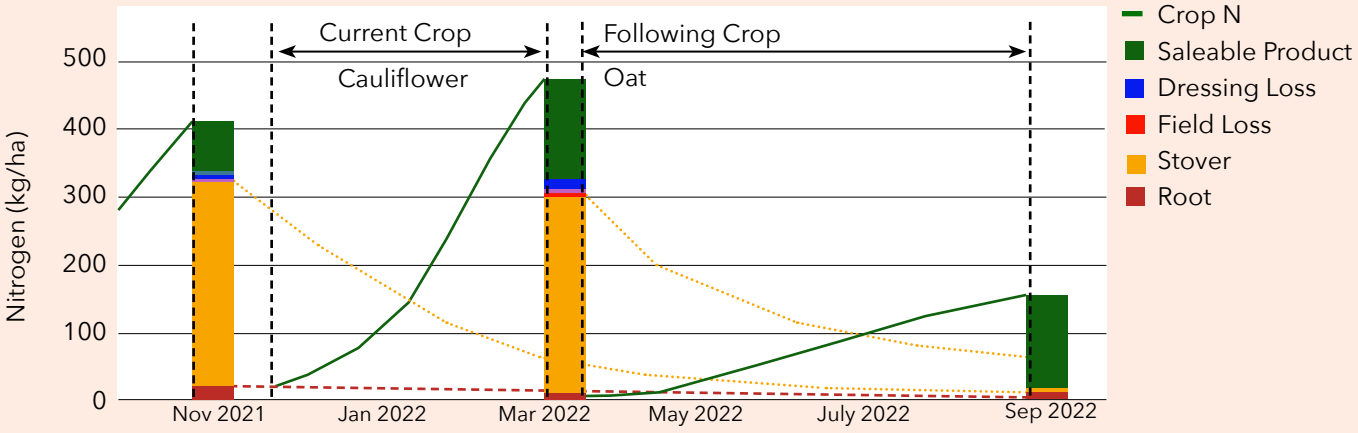


Figure 1. *Graph from the prototype tool showing nitrogen flows. Crop uptake and residue breakdown*

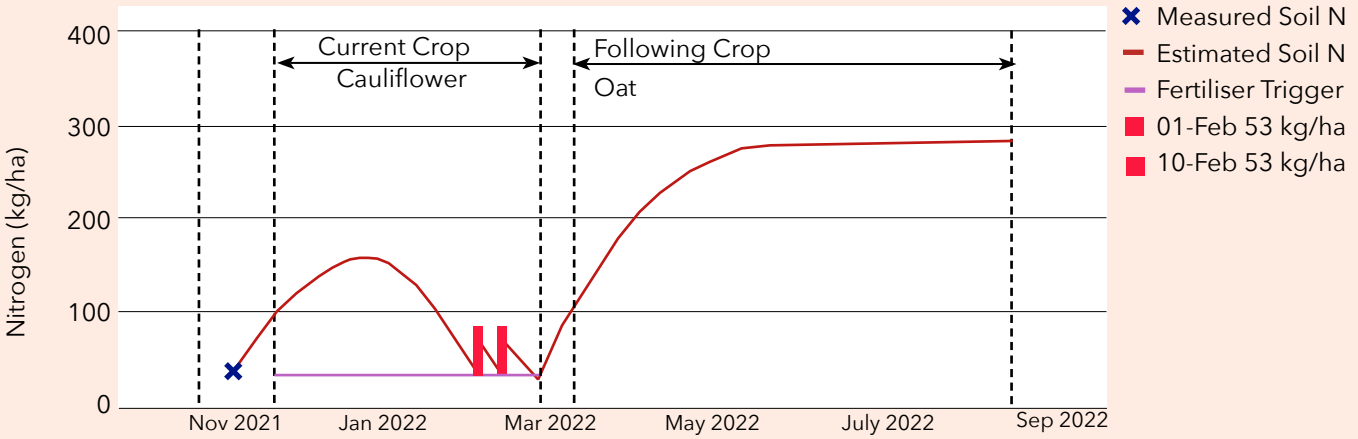


Figure 2*. Graphs from the prototype tool showing soil mineral nitrogen and a guide for nitrogen fertiliser requirements (quantity and timing)*

the starting point, or as a reset during the season, to then guide and justify the nitrogen fertiliser programme based on what is there.

SVS will provide growers with the evidence they need in their Farm Environment Plan, in the form of a nitrogen budget, to justify their fertiliser applications.

The programme will be taking onboard the feedback of growers, agronomists, and other industry experts to help guide the tool's development over the next 18 months.

> **SVS will provide growers with the evidence they need in their Farm Environment Plan, in the form of a nitrogen budget,to justify their fertiliser applications**

SVS – Looking ahead

There is much to be excited about within SVS over the next six months. As the intensive trials come to an end a wealth of data will become available for analysis by statisticians, scientists, agronomists, growers and model users. The data will shed further light on the complex relationships between plants and soil, giving us a better understanding of the different forms of nitrogen and how these change over time in the soil. The impact of crop residue breakdown is of enormous interest.

Going into winter it will be interesting to see what changes the wet and cold conditions promote in soil mineral nitrogen stocks across the regional monitoring sites. As the highest risk period for leaching, this is always of special interest.

> **The Sustainable Vegetable Systems (SVS) programme continues to progress on all fronts with an ever-growing data set to support growers' nitrogen decisions**

All this data will continue being fed into the model underpinning N-Sight. With a new community of practice using the prototype, and comparing regional observations and industry experience, the tool will see significant development over the next six months.

DON'T TREAT YOUR SOILS LIKE DIRT

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

I remember a poster at a soils conference I attended a number of years ago that stated, 'Stop Treating Soils Like Dirt.' It was a catchy phrase and a play on words but the message was incredibly important as humans have been responsible for the degrading of soils for thousands of years.

This has resulted in topsoil loss and desertification, with vast swaths of once productive land in the world now being virtually useless. Fortunately in New Zealand, most of our productive land has only been used for growing food for a couple of hundred years at the most, so the amount of degradation is significantly less than in much of Europe, Asia, North America, Africa and the Middle East.

The European Commission has come out with a Mission Area: Soil, Health and Food. It states, *"Healthy soils are essential for our life and that of future generations. Soils form the skin of the earth and are fundamental for all life-sustaining processes on our planet. A mission in the area of soil health and food will mobilise resources and people (e.g. researchers, land managers, public authorities, businesses and citizens) to engage in activities for soil restoration, as this is* ***the basis for healthy people and a healthy planet".***

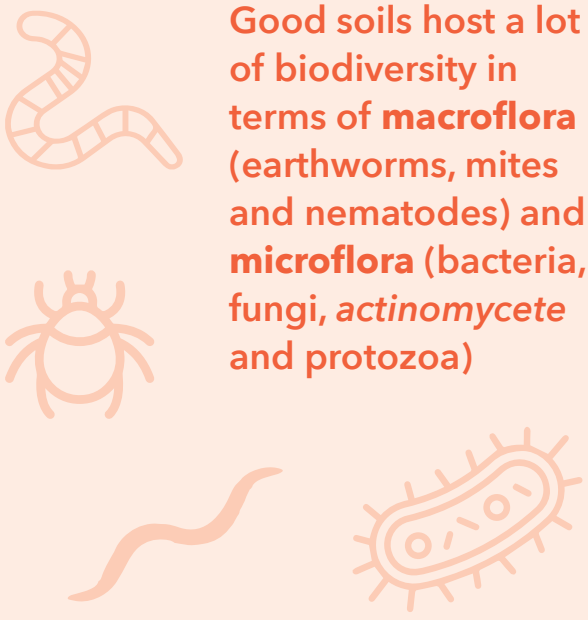
The physical components of soil are air, organic matter, minerals and water, so having these in the right ratios is important for determining a healthy soil, the life-sustaining skin of the earth. In rough figures, water and air should each make up approximately 25 percent of the volume of a good productive soil, organic matter 5–10 percent and mineral matter 40–45 percent. Breaking down the mineral matter into components, an ideal loamy soil for growing plants would comprise 40 percent sand, 40 percent silt and 20 percent clay.

Ancient geological processes have largely determined the mineral complexity of each unique soil type and these physical and chemical characteristics cannot be changed except with significant cost. Most soils degraded from human activity have lost pore space through compaction and over-working, so that the air and water ratios will have declined markedly. Similarly the organic matter content will have dropped through soil inversion, resulting in carbon dioxide being lost to the atmosphere.

Much of the Northern Hemisphere's once productive soils on all continents now have organic matter levels between one and two percent, whereas in New Zealand most of our soils still have organic matter levels of five percent or more.

> **"The physical components of soil are air, organic matter, minerals and water, so having these in the right ratios is important for determining a healthy soil, the life-sustaining skin of the earth**

The functions of healthy soils are not only to provide food, fibre and wood for us, but they also provide important ecosystem services. They help prevent flooding as water is adsorbed through the topsoil, acting like a sponge, compared to a compacted soil where rain water just runs off, removing soil particles with it. With good pore space, soils also help retain moisture, lessening the effect of



Good soils host a lot of biodiversity in terms of **macroflora** (earthworms, mites and nematodes) and **microflora** (bacteria, fungi, *actinomycete* and protozoa)

droughts, and they also have purifying factors in providing fresh clean water by filtering out contaminants.

Good soils host a lot of biodiversity in terms of macroflora (earthworms, mites and nematodes) and microflora (bacteria, fungi, *actinomycete* and protozoa) and a healthy soil could contain as many as 20 billion micro-organisms in a teaspoon of soil – two and half times the current human population. Thirty years ago, this number of microbes was measured on the Horotiu Sandy Loam, a Class 1 soil type found at Ruakura Research Centre. Our soils should ideally be sequestering carbon and acting as a storage mechanism for greenhouse gases, part of the solution to a changing and warming climate. As well as recycling carbon, our soils ought to be recycling other essential elements such as nitrogen and phosphorus through microbial activity. The utilisation of essential nutrients applied to the soil as fertiliser is much greater in a fully unctioning soil where leaching is reduced, and plant uptake enhanced.

Ninety-five percent of the food we eat comes from the soil, and sustainable soil management can not only maintain, but also significantly improve crop production by over 50 percent in many situations. Rebuilding topsoil is imperative to the survival of our species into the future. Each centimetre of healthy topsoil has taken hundreds, if not thousands of years to build up naturally in the past, yet within a short few years of abuse, this can all be lost. Restorative practices such as no till or minimum tillage, use of green manure crops, maintaining vegetative cover, and reducing herbicide, pesticide and synthetic fertiliser use to a minimum of what the crop actually requires, not overdoing chemical inputs, are all practices which will benefit soils and our planet long-term.

> **Healthy soil could contain as many as 20 billion micro-organisms in a teaspoon of soil – two and half times the current human population**

It is estimated worldwide, that about a third of the land once used for food production has now been lost by soil degradation from erosion, salinisation, compaction, acidification, pollution, contamination or leaching of nutrients. Topsoil loss resulting in the desertification of much of the Middle East and North Africa is testament to what happens when we 'treat our soils like dirt.' We need to protect this ever-diminishing precious resource, which we have become stewards of in this moment in time for the sake of future generations.

Ninety-five percent
of the food we eat comes from the soil

BIOSECURITY AND HYGIENE CONSIDERATIONS FOR RPCS

Anne-Marie Arts : The AgriChain Centre, managing director

How the pepino mosaic virus' arrival in the tomato industry helped foster a deeper understanding of options and challenges of RPC management

Returnable plastic crates (RPCs) are an integral part in moving fresh produce, both domestically and internationally from growers to retail. In New Zealand's case, RPCs are extensively used to transfer produce within the domestic supply chain.

The recent incursion of pepino mosaic virus and brown rugose fruit virus is a phytosanitary risk to the tomato industry. Transmission of these viruses is usually attributed to contact with infected seeds, plant material, or surfaces such as RPCs, belts, forklifts, etc.

This incursion created an opportunity to review current practices in order to prevent further spread of the virus, and to align with international best practices.

When the pepino mosaic virus incursion of 2020–2021 occurred, TomatoesNZ and the Ministry for Primary Industries (MPI) began investigating to what extent commercial solutions needed to be supported through biosecurity focused regulatory interventions.

The United Fresh Technical Advisory Group (TAG) also contributed by conducting desk-based research, exchanging views within its local and global networks on RPC hygiene management in other countries, facilitating an exchange of information, and arranging for an industry workshop on the topic via Zoom, with IFCO US (International Food Container Organisation) presenting at that workshop.

United Fresh, as the pan-industry body for the fresh produce industry in New Zealand, has taken a keen interest in the evolution of RPCs right from their inception 30 years ago. RPCs are used across the entire fresh produce range and travel the fresh produce supply chain from grower to retail and back again, in their tens of thousands, across the entire country, every day of the week.

The interest of United Fresh was initially driven by the sustainable nature of the RPC concept, long before sustainability became the buzzword it is these days.

The United Fresh TAG team then worked with TomatoesNZ Inc. and MPI to better understand the risk the viruses presented and to find RPC related solutions that could address the need of the tomato industry without compromising the needs of other product categories also reliant on RPCs.

The challenge faced was that finding crop-specific remedies is an appropriate strategy for managing internal crate pools used to move crops from a glasshouse to a packhouse. However, applying crop-specific remedies

to RPCs hired from external crate pools being used to move a given crop between packhouse and retailer is not an option, as RPCs used to transport tomatoes this week could be used, for example, to ship apples a fortnight later and carrots a fortnight after that.

There are many plant diseases, including viruses, capable of disrupting produce supply. Each industry sector trying to tackle RPC hygiene in the commercial supply chains on their own, in order to optimise crop-specific positions, is not viable or sustainable risk management.

Understanding as an industry what the common risk factors of RPC hygiene are, enables economies of scale to become a factor, and leads to accelerated learning for the entire industry, as opposed to on a sector-by-sector basis.

IFCO, which is the largest global RPC provider, has undertaken a considerable amount of research into risks associated with crate hygiene issues. It continually conducts applied research aimed at better understanding the efficacy of current RPC cleaning methods, and any possible process improvements that can be made when sanitising RPCs to prevent the spread of the tomato brown rugose fruit virus.

The existence of an International Washing Standard for RPCs (DIN 10522:2006-01) demonstrates the efforts by IFCO and other organisations to enable crate users to effectively and efficiently manage RPCs used to transport fresh produce from production areas to consumers.

United Fresh recently released a document that compiles and analyses international research and knowledge on RPCs related to the management of the pepino mosaic virus and brown rugose fruit virus within the fresh produce industry, which includes the following recommendations:

- Separation of RPCs used for transporting produce to a packhouse from those RPCs used to ship produce to wholesale markets or retail distribution centres, contributes to mitigating the risk of spreading a virus if it is present in a glasshouse.
- Washing and hygiene monitoring practices should be regularly reviewed by all crate pool owners to align with best practice.
- Frequent monitoring and testing of the RPC washing process minimises the risk of RPCs becoming a spreading route for pathogens.
- Growers should consider using a Standard Operating Procedure for maintaining RPC cleanliness prior to use.
- Adoption of the International Washing Standard for RPCs (DIN 10522:2006-01).

RPCs operating in a closed loop environment on grower properties also need to be cleaned regularly to mitigate phytosanitary risks. The United Fresh Technical Advisory Group compilation document is available on the United Fresh website.

PRODUCT GROUPS

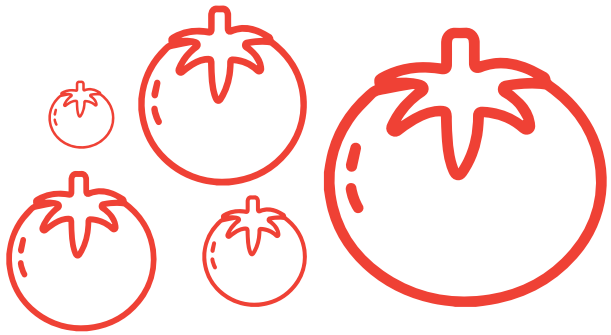
ALL THE LATEST NEWS FROM YOUR PRODUCT GROUPS

TomatoesNZ

GROWER EXPERIENCES AND AGM

Dinah Cohen : TomatoesNZ Inc. business manager

TomatoesNZ would like to invite all members to the Grower Experiences and annual general meeting (AGM) event on 17 August, between 3pm and 5pm. We will be holding this event both in person in Pukekohe and online via Microsoft Teams. Please email Dinah.Cohen@hortnz.co.nz if you would like to attend via either format, and you will be sent all the information you require.



Ben Smith (T&G), Roelf Schreuder (NZ Gourmet) and Stefan Vogrincic (Grower2Grower) will be sharing their insights on pests, irrigation and technology.

If you grow tomatoes for the fresh market, you should be paying levies and you are therefore a member of TomatoesNZ so we would love to welcome you to our event. If you cannot attend the AGM in person or online, please still consider voting by proxy to have your say.

Between 3pm and 5pm

ENERGY TRANSITION PLANNING FOR COVERED CROP GROWERS IS HEATING UP

Antony Heywood : Vegetables New Zealand Inc. general manager

Marc Roberts inspects biomass chip for moisture and content

Covered crop growers are committed to decarbonisation. With the help of the Energy Efficiency and Conservation Authority (EECA), there is a good chance they will decarbonise process heat to only three percent of current levels by 2040.

According to a recent report by DETA Consulting, the covered crop industry is forecast to emit 200,000 tonnes of CO_2 per year, if no mitigation factors are undertaken. With energy efficiency measures and renewable energy sources employed, this will be reduced to 6000 tonnes of CO_2 in 2040.

The first step on the energy pathway for covered crops is underway. With the support of EECA, Vegetables New Zealand Incorporated (VNZI) has entered into an Industry Collaboration Partnership. This unlocks co-funding (EECA 50% – VNZI 50%) to get four case studies completed.

The case studies are to provide growers with energy efficiency alternatives that can be applied to renewable energy solutions.

These bespoke plans are testing a pathway for all other covered crop growers to follow. Each case study report will be shared with all covered crop growers to give confidence in the process of developing energy transition plans, and assurance that they will deliver economically viable solutions.

> **“ The case studies are to provide growers with energy efficiency alternatives that can be applied to renewable energy solutions**

It is important to note that the case studies are only available to small to medium sized growers. Larger covered crop operations have access to other EECA funding options like the Government Investment in

Leanne Roberts, middle, with her son, Joseph Hedley, left and father, Marc Roberts, right, outside their biomass boiler refit

Rob Lindsay (Jade Gardens) inspecting his thermal screens

Decarbonising Industry (GIDI) Fund and Energy Transition Accelerator (ETA) co-funding options. GIGI and ETA have CO_2 emission thresholds that small to medium sized businesses are unable to meet.

VNZI is working with EECA and TomatoesNZ (TNZ) to deliver energy transition plans for all covered crop growers. The case studies are a first step. The second step, while not fully developed, will extend knowledge developed in the case studies to a full roll-out of energy transition options for covered crop growers.

The next covered crop grower event will be at the VNZI Roadshow in Pukekohe on 27 July. This is an event not to be missed as EECA and VNZI will be updating all growers on the second step of the energy transition pathway, as well as on other covered crop technology.

onions NEW ZEALAND INC

HUMBLE TO HERO: LAYING STRONG FOUNDATIONS FOR YEARS TO COME

Kazi Talaska : Onions NZ Inc. market access manager

The Humble to Hero Sustainable Food and Fibre Futures (SFFF) programme is a partnership between Onions New Zealand and the Ministry for Primary Industries to transform the New Zealand onion industry. Humble to Hero supports projects and workstreams around three themes: market validation and diversification; enabling value by providing assurances; and capturing value by sharing the onion story supported by food science and provenance claims.

The programme will expand the number of export markets and the Free on Board (FOB) value of those markets to increase overall industry value and set up the infrastructure required to build resilience in what is an increasingly competitive world trade environment. Programme direction is supported closely by industry.

The six-year programme is set to finish its first year at the end of June 2022, with planning for year two underway. Below are the highlights that the programme has helped to achieve in the past year, which has set a strong foundation for transformative projects in years to come.

Shipping best practice

Exporting is a major part of the New Zealand onion industry, with approximately 80 percent of production volume exported in any given season. It is also no secret that across the industry, shipping disruptions and increased costs have been the headlining challenge for exporters since the pandemic closures in early 2020 to the Ukraine war this year. Year one Humble to Hero saw the establishment of a project targeted at developing guidance and specifications for container operations in the New Zealand onion industry. The idea is to understand and reduce variability in container performance, and thus improve retention of product quality en route and in market.

So far, eight shipping containers have been sent to markets across Europe and Southeast Asia, with exporters and researchers working closely together to install and monitor data from remote sensors.

Exporting is a major part of the New Zealand onion industry, with approximately

80%

of production volume exported in any given season

Phytochemical analysis

What is the difference between the New Zealand onion and any other onion around the world? Identifying the New Zealand onion's unique selling point is the first part of creating value for the product around the world.

Onions have been sourced across the country and information around varieties, time to harvest, and block data was collected. Onions were analysed for flavonoids, fructans, and organosulfur compounds, some of which have proven health benefits.

Onion residue programme

Pivotal in being able to tell the New Zealand onion story to our consumers is data. Understanding the use of agrichemicals, fertiliser or water are important in the low residue, food safe, and sustainability story of fresh produce.

In the past year, Humble to Hero supported the collection of 187 residue samples from industry. These samples increase transparency and add confidence to the grower story.

> "Onions have been sourced across the country and information around varieties, time to harvest, and block data was collected. Onions were analysed for flavonoids, fructans, and organosulfur compounds, some of which have proven health benefits

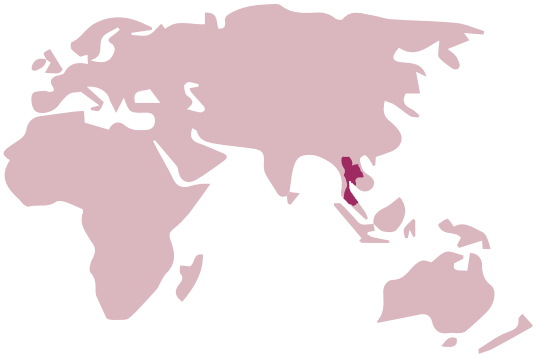
IT system overview

How is data collected and distributed through the industry? What data is important and how do we future-proof our information systems? Humble to Hero has undertaken work to address the need to improve data governance, systems, and future investment.

Thailand market access

As part of the theme around market access, validation and diversification, Onions New Zealand continues to respond to trade barriers. Working closely with government officials, New Zealand onions were successful in gaining full market access to Thailand as of late May.

The Thailand market is expected to be a NZ$1 million market with potential to double in value over the next few years. This supports the value of these workstreams in expanding the global footprint and resilience of New Zealand onions, where market access is a continued uphill climb challenged by volatile changes, remembering that market access and product value go hand in hand. ●



The Thailand market is expected to be a NZ$1 million market with potential to double in value over the next few years

MASTERCLASS WITH A MASTERCHEF: INSPIRING TEACHERS TO BRING COMPETITIVE FUN TO THE CLASSROOM

Julie North and Sara Collie : Vegetables.co.nz

As a gold partner of HETTANZ (Home Economic and Technology Teachers' Association), vegetables.co.nz took the opportunity to provide a Masterclass at the association's annual conference held in Christchurch this May.

Run across three days, the conference was a fantastic opportunity to showcase vegetables and the Food Skills for Life programme. Knowing many teachers were keen to learn more about how to deliver a Masterclass-type challenge in the classroom, former MasterChef contestant Vanessa Baxter was engaged to deliver a great practical session. Her key focus: *set up for success.*

Capped at 40 attendees, the session was booked out well in advance, with a further ten attendees turning up on the day.

Vanessa focussed on overcoming barriers put forward by those in the room: 'not enough time', 'requires too much planning' and 'a lack of facilities' by encouraging competitive elements in what is already being done in the classroom.

With the emphasis clearly on vegetables, she encouraged teachers to bring in some fun using a lesser-known vegetable as a 'random ingredient' or by concentrating on presentation of the dish – something that can be a lot of fun with the different colours and textures of vegetables. Students who are less inclined to enjoy cooking can be encouraged to participate through creatively capturing the dishes using photography or film (think TikTok and YouTube).

Former MasterChef contestant, Vanessa Baxter, inspired teachers with new ideas for incorporating vegetables into their classroom cooking lessons

Overall, a fantastic session leaving everyone inspired and motivated, with encouraging feedback:

"I now have ideas to further develop my veg up pizza class – setting them up for success"

"Excellent – so incredibly focussed on student success and inspiring for teachers"

National Secondary Schools Culinary Challenge

The session at HETTANZ was also a great opportunity for Vegetables.co.nz to remind teachers to encourage their hospitality students to enter the 2022 National Secondary Schools Culinary Challenge (NSSCC). Entries have been shifted to an online platform this year to avoid disruptions from Covid-19. It will be exciting to see what the teams of two enter as their entrée, which must hero beetroot this time.

Regional finalists will be announced later this month, with the final taking place in Auckland in September. This competition remains an important way to keep vegetables in pride of place on entrée and dinner plates as young students go on into tertiary hospitality training.

"I now have ideas to further develop my veg up pizza class – setting them up for success"

"Excellent – so incredibly focussed on student success and inspiring for teachers"

HOW TO PREVENT WINTER MOULDS AND DISEASES USING DEHUMIDIFIERS

Moulds, mildews and other diseases, such as Botrytis, or powdery mildew, are a major problem in greenhouse cultivation.

These diseases have one thing in common – they require high humidity to develop. This can happen at any time during the year. However, low temperatures increase the risk of high humidity, making winter especially dangerous for greenhouse crops.

How does mildew develop?

Mildew can develop anywhere, as long as the conditions are right.

Greenhouses are naturally humid, so without intervention, relative humidity can easily reach 100 percent. At this point, water begins to condense on different surfaces in the greenhouse, creating a hotbed for fungal pathogens.

Diseases related to humidity are especially difficult to deal with because they don't need long periods of high humidity to develop. A short period is enough for mould to break out. It can then continue to develop and infect more plants, even if humidity has since been reduced.

The only way to completely prevent moulds and other diseases related to humidity, is to keep humidity under control at all times. This is tricky, as weather conditions fluctuate throughout the day and night.

Why is mildew more common in the winter?

Relative humidity and temperature have a reciprocal relationship. Cold air can hold less water vapour than warm air. Even if the absolute amount of moisture remains the same, relative humidity will be higher in lower temperatures.

Cold conditions therefore make it harder for growers to keep humidity in check, and much easier for diseases to develop.

Are dehumidifiers necessary to control humidity?

Traditionally growers would prevent high humidity by ventilating and heating. Ventilation can be very effective in releasing moisture from the greenhouse, under certain conditions. However that isn't always the case.

When it is rainy, damp, or too cold outside, as it often is in Winter, releasing humidity may not help at all. Relying on this method makes it impossible to fully control humidity at all times, making mould development inevitable.

Even when ventilation does successfully reduce humidity, it does so at a very high cost. Releasing air from the greenhouse means releasing heat and introducing cold air from outside. Growers need to keep heating continuously, just to maintain ideal temperatures.

Dehumidifiers, on the other hand, provide full coverage at all times, without opening up the greenhouse for ventilation. By avoiding the necessary conditions for mould development, you can ensure a very high prevention rate, even in the most problematic periods.

Besides being more effective, dehumidifiers are also much more efficient. Designed specifically for the task of extracting moisture in a greenhouse environment, dehumidifiers require a lot less energy to get the job done.

Using a dedicated dehumidifier that is made for use in horticultural environments, such as DryGair, can save as much as 50 percent on energy. Needless to say, heating costs are tied to energy prices. So as energy prices rise, so does the cost of heating and venting, making dehumidification more and more economically beneficial.

For more information contact Advanced Hort on **0800 467 883** or **sales@advancedhort.co.nz** or visit **drygair.com**

TUATARA STRUCTURES – DELIVER WELL BUILT. GO WELL BEYOND

Tuatara Structures is a relatively young construction company but is already a leader in the design and construction of industrial, commercial and agri-buildings. Dedicated to providing clients with innovative solutions to their building needs, Tuatara Structures delivers robust, fit-for-purpose buildings across New Zealand.

Their turnkey design-build solutions are ideal for coolstores, packhouses, food processing and storage facilities.

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

The unique swing-leg roof lift technique they utilise means the buildings are faster, safer and more cost-effective to construct than the industry standard. While meeting build deadlines is a priority, meeting budgets is just as crucial, and with an experienced and capable team, Tuatara Structures delivers every time.

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

Following this consultation, they will present clients with a set of concept drawings, a detailed scope, and a fixed-price investment proposal for consideration.

This proposal encompasses all parts of the build process – from consenting and other approvals, excavation and site works, and the build itself, through to office fit-outs, racking, refrigeration, and other specialist trades.

The detailed plans and fixed-price investment proposal are essential elements in the Tuatara process, providing clients with absolute budget certainty. These documents can also help secure lending approval and board-level sign off when required.

Tuatara Structures is disrupting the old-school traditional tender and bid delivery where you find out the project cost after it has been drawn. Their strategy to provide clients with a streamlined build process has produced impressive results since entering the market.

They have worked with a wide range of agri-business industry clients, including Turners & Growers, Thomas Bros Orchards, Ohapi Fresh and Stonewall Farms.

Current agri-business builds include the recently completed 2,700m2 coolstore for Hume Pack-N-Cool in Katikati, and an over 3,500m2 integrated coolstore, packing area and dispatch office for Southern Fruits International, the packing and marketing division of Deep Creek Fruits in Tarras.

Client Sharon Kirk of Deep Creek Fruits said, "Our experience working with Tuatara Structures has been positive from the start. Every person we've had contact with has been knowledgable, enthusiastic and helpful, making the process to get the Southern Fruits International packhouse designed, signed off and now starting to be built, seamless. We are looking forward to this year's cherry season being completed in the new building."

To learn more visit **tuatarastructures.com**, or call **0800 600 750** and see how they can help solve your construction challenge.

GYPSUM – A TRUE MULTITASKER

Growers must manage their soil well to maintain good crop yields year after year.

The calcium component of gypsum is important for mineral uptake and is one of the priority nutrients to be balanced in the soil. Calcium supports cell wall strength, plant resilience, plant growth and crop quality. Starting seedlings off with luxury levels of calcium in the soil at planting and during crop establishment can lead to more resilient plants. The sulphur component is also key as it is part of an enzyme used in metabolising nitrates and in the production of quality proteins.

According to the Soil Science Society of America, gypsum makes calcium and sulphur more available to plants than other common sources of these nutrients. Finely ground gypsum particles are small and uniform in size making them quite reactive. This can be a real benefit.

Grower Bharat Bhana, Hira Bhana in Pukekohe, says he has found applying gypsum to production areas improves soil quality, making the soil more workable and friable.

"Regular applications every couple of years are required to maintain those soil quality improvements, as gypsum doesn't last in the soil forever," Bharat says.

Learning from Soil Science around the world

Gypsum can decrease and prevent crust formation on soil surfaces which result from raindrops or sprinkler irrigation on unstable soil. Prevention of crust formation means greater seed emergence, more rapid seed emergence and establishment.[1]

Gypsum is also a moderately soluble mineral,[2] meaning the calcium from gypsum can move further down into the soil profile. The calcium in gypsum inhibits aluminium uptake at depth in the soil, promoting deeper root systems in plants. More abundant roots that grow deeper into the soil profile, take up more water and nutrients, even during the drier periods of a growing season.[1]

Gypsum is called the clay breaker as the sulphate bonds with excess magnesium in the soil to create magnesium sulphate, which is very easily leached from the root profile. With the correct ratios of magnesium, calcium and potassium, this allows soils to breathe and increase water infiltration and drainage through the soil profile.[3] Gypsum also reduces phosphorus movement out of the field into waterways.[4]

Unsure of your calcium levels?

If you are unsure of your soil's calcium levels, refer to the percent base saturation on your soil lab test report. Depending on the soil type, calcium should be between approximately 60 and 80 percent, magnesium 10 to 20 percent and potassium 3 to 5 percent. A clay soil can hold higher levels of calcium than sandy soil. Talk to your fertiliser advisor for further information and guidance.

Gypsum is a true multitasker capable of supporting healthy crop establishment and improving soil structure. Gypsum is BioGro certified.

For more information, visit: **www.gypsum.co.nz**

[1] Gypsum as an Agricultural Amendment, USA, Bulletin 945.
[2] https://www.soils.org/news/science-news/gypsum-agricultural-product/, 2019
[3] Nutritech Australia Soil Therapy Guidelines Part 3, 2017
[4] Gypsum as an Agricultural product, Soil Science Society of America, USA, Bulletin 945

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Quarter Page	$435	$420	$395	$355
Eighth Page	$245	$235	$225	$205
Cameo (W40 x H65mm)	$145	$140	$135	$125

Custom $40 per column cm

To book a classified advertisement in our next issue contact:
Debbie Pascoe (09) 2363633, M: 0274 858562
Email: dpascoe@xtra.co.nz

ENZA ZADEN

We all love Pumpkins

GREY:

SAMPSON: Super reliable large size. Vine type, this strong plant produces large fruit, mid grey in colour, heavy and dense. Sampson has good fruit set and high yield potential. Sampson fruit has a concave top with thick, fleshy shoulders for maximum processing yield. Fruit is lightly ribbed with a small neat blossom end. Internal quality is exceptional; dark orange flesh and a very small seed cavity. Ideal for fresh cut fruit sales. The fruit stores well. Fruit size of 5 to 7kg.

MINARAY: Long storing medium size. Vine type, medium sized grey pumpkin with excellent storage potential, ideal for whole fresh market or cut fruit sales. Flat-round shape with heavy shoulders and dark orange flesh. Very high fruit numbers and total yield. Fruit size 3.5 to 4kg with nice uniformity.

NELSON: Very early type. Early bush type, flat round shape with broad shoulders. Nelson is a very vigorous bush hybrid with early maturity. The bush habit results in easier growth management, easy mechanical weeding and allows higher population densities. The first fruit set is close to the crown, but if conditions are good, the plant can grow a vine with a later fruit set. The internal flesh colour is very attractive uniform dark orange. Fruit size of 4 to 6kg.

RED/ORANGE:

ORANGE SUMMER: Tasty thin skinned. Semi-bush with early maturity, orange coloured fruit and flattish globe shaped fruit with thick walled flesh. Orange Summer shows early flowering which results in early fruit setting. Because of this, most fruit setting is near the base of the plant, which can give easier harvesting and allows mechanical weeding for a longer time. Has mild storage and excellent eating quality. Fruit size of 1.2 to 1.6kg

FLEXI KURI: Tasty and virus resistant. Vine type with early maturity, commercial introduction. Orange coloured fruit, flat round shaped fruit with flattened top for stem protection during post harvest. Improved yield per plant with thick walled flesh. Shows early flowering which results in early fruit setting. Good storage and taste. Fruit size of 1.2 to 1.6kg.

BUTTERNUT:

TIANA: Many small perfectly formed fruit. Vine type with medium-early maturity, Tiana is suited for small size fresh market sale. Cylindrical shape. High yield potential compared to OP-comparison. The fruit quality is very consistent and the flesh has an intense dark colour. Fruit size of 1 to 1.2kg.

HAVANA: Larger high yielding traditional shape. Compact vine type, early maturing Butternut with good uniform internal colour. Classic Waltham fruit shape. Higher yield compared to standard OP types. Excellent storability. Fruit size of 1.2 to 1.5kg.

Enza Zaden NZ have a wide range of pumpkin varieties, from the super reliable Sampson, the long storing Minaray, to the tasty thin skinned Orange Summer and butternuts. Enza Zaden have proudly supplied commercial pumpkin and butternut varieties for many decades in the New Zealand market. We are breeding improved varieties with our local breeding team.

Please call us direct on 09 963 0122 to request seed of any of our varieties.
Contact Beverley Vahai 021 193 1008 or sales@enzazaden.co.nz for customer support.
For technical advice on open field crops, contact Aneil Hari 021 367 242, or sales manager Herman van der Gulik 021 858 939.
www.enzazaden.co.nz

Enza Zaden is proud to support the Rural Support Trust Evening with Sir John Kirwan. The Rural Support Trust helps rural people when times are tough. If you need help before issues overwhelm please contact 0800 787 254.

Rural Support