Hort Innovation

Final Report

Vegetable Industry Leadership and Development Missions – 2019

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Delivery partner:

AUSVEG

Project code:

VG18002

Project:

Vegetable Industry Leadership and Development Missions – 2019 VG18002

Disclaimer:

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Content

Summary

Project VG18002 *Vegetable Industry Leadership and Development Missions – 2019* provided an opportunity for a group of emerging leaders in the Australian vegetable industry to visit innovative growing operations, research facilities, agribusinesses and other innovative areas around the world, as well as attending some of the world's leading events in the international fresh produce industry.

The project provided the opportunity for 25 growers to participate on these tours, which included:

- Tour 1 – European Industry Leadership and Development Mission – Berlin Fruit Logistica
- Tour 2 – U.S.A. Industry Leadership and Development Mission
- Tour 3 – European Industry Leadership and Development Mission – Agritechnica

There were a number of other vegetable growers who participated in the missions who paid the full fee (i.e. were not subsidised by the vegetable research and development levy).

The three tours were aligned to three of the world's leading events in the fresh produce industry, which included:

- Berlin Fruit Logistica
- PMA Fresh Summit
- Agritechnica

Following their return to Australia, participants shared their new-found knowledge with friends and colleagues to disseminate the key insights discovered from the mission to the wider Australian vegetable growing community. Coverage of the mission will appear in a future edition of *Vegetables Australia*, the most widely distributed magazine in Australian horticulture, as well as AUSVEG's Weekly Update e-newsletter and social media channels.

The missions allowed participants to experience the large scale of horticultural production in other growing regions around the world, providing a clearer insight into industry nuances, production practices, new technologies and issues facing growers in those countries. The itineraries also provided the opportunity for growers to see the latest in global technologies and innovations, high-tech protected cropping and robotics, and network at the leading fresh produce industry events.

Participants were exposed to production practices in a range of horticultural crops, as well as the ways that growers are incorporating sustainable initiatives and value-adding elements to their businesses. Most importantly, participants were able to expand their local and international networks and broaden their knowledge and understanding of the vegetable and wider horticultural industries. Upon their return to Australia, attendees planned to review the strategic direction of their businesses and incorporate new ideas and technologies into their growing operations.

Monitoring and evaluation was conducted through written evaluations that were completed by participants to provide a record of each day's events and ensure information was retained, while debriefing sessions were held throughout each mission to discuss key points of interest.

It is recommended that future industry study tours for the vegetable industry are combined into one longer-term project to streamline administration and reporting requirements and to include, where practicable, more face-to-face time with international growers to discuss their growing operations and practices.

Keywords

Industry Leadership and Development; vegetable industry; Europe; United States; U.S.A. horticulture; networking; grower mission; grower tour; European vegetable production; American vegetable production; new technology; biologicals; vegetable research; Berlin Fruit Logistica; Agritechnica; PMA Fresh Summit; AUSVEG; Hort Innovation.

Introduction

For many years, Australia's vegetable growers have benefited from the opportunity to attend international grower tours to key vegetable production regions around the world. These tours have successfully allowed participants to be exposed to the global horticulture industry and meet their peers in different countries to discuss similar challenges and practices, as well as those specific to their regions.

The ability to temporarily step away from Australian horticulture and gain a new perspective on the industry has helped to foster innovation in the Australian vegetable industry, as participants have brought back new knowledge and practices to improve the efficiency and profitability of their operations, as well as the competitiveness of the wider industry.

VG18002 *Vegetable Industry Leadership and Development Missions – 2019* provided the opportunity for 25 growers to participate on industry study tours, which included:

- Tour 1 – European Industry Leadership and Development Mission – Berlin Fruit Logistica
- Tour 2 – U.S.A. Industry Leadership and Development Mission
- Tour 3 – European Industry Leadership and Development Mission – Agritechnica

Itineraries were developed to ensure participants were exposed to production practices in a range of horticultural crops, as well as innovative growers who are incorporating sustainable initiatives and value-adding elements to their businesses. These tours were also designed to ensure participants were able to expand their local and international networks and broaden their knowledge and understanding of the vegetable and wider horticultural industries.

Meetings were organised with growers, researchers and agribusinesses to ensure a diverse range of topics were discussed throughout each mission. These included on-farm production practices and innovations (both conventional and organic), packing house and processing developments, key areas for vegetable research, labour sourcing programs, agtech innovation, biological crop protection and vegetable seed protection and production. In addition, participants also visited fresh produce retail outlets to see how produce is presented to consumers and the value-adding options that growers have created to minimise waste and increase profitability.

Regular debriefings were held throughout the mission to discuss the key insights and highlights from the meetings undertaken. Participants were encouraged to take notes of meetings and completed an evaluation form to provide feedback on the success of the mission. Upon their return, participants shared their findings with their networks and through industry communications, allowing the wider Australian vegetable industry to benefit from the tour.

Vegetable Industry Leadership and Development Missions – 2019 was a strategic levy investment under the Hort Innovation Vegetable Fund.

Methodology

Detailed itineraries were provided to the 2019 Industry Leadership and Development Mission participants prior to their departure, as well as a hard copy booklet including the mission's itinerary and participant contact details. Below is a detailed summary of the events and activities that took place during each mission.

European Industry Leadership and Development Mission – Berlin Fruit Logistica

Tour Lead: Zarmeen Hassan

Days 1 and 2: Monday 4 February 2019 to Tuesday 5 February 2019

Travel Day

Participants travelled individually from Australia to Berlin. The group met en route and travelled to their accommodation before attending a group dinner.

Days 3-5: Wednesday 6 February 2019 to Friday 8 February 2019

Berlin Fruit Logistica

The 2019 European Industry Leadership and Development Mission began with the delegation attending the 2019 Berlin Fruit Logistica, the world's leading trade show for the fresh produce sector. The previous year's event attracted around 78,000 local and international delegates and featured 3,239 exhibitors; the 2019 Logistica surpassed those numbers, proving the event continues to be one of the premier meeting places for the international fresh produce industry. The 2019 Logistica featured 78,269 delegates from 135 different countries, with the trade show featuring 3,276 exhibitors – 2,979 of which were international exhibitors. Such an expansive trade show provided the opportunity for the growers on the mission to split up and meet with numerous representatives from all different aspects of the fresh produce industry, from seed companies to agrichemical companies, farm machinery and robotic technology companies, packaging and logistics companies and all other areas of the supply chain. Delegates were encouraged to take notes of any stands of interest so that they could return for further discussions during the Logistica.

Throughout the time spent at the Logistica there were multiple networking events organised by AUSVEG for the participants to meet with representatives from some of the world's leading agribusinesses and to broaden their networks. These meetings were interspersed throughout the duration of the Logistica and included meetings with representatives from the following companies:

- Bayer
- Syngenta
- Rijk Zwaan
- Koppert Cress
- BASF

These companies hosted some or all of the growers at their stands and were generous with their time to discuss their products, services and experiences in the international fresh produce industry. These companies in turn were grateful for the chance to have face-time with some of Australia's leading vegetable growers to gain an insight into their concerns and issues that they face on farm back home. Many of these companies host the Australian vegetable industry delegation each year a mission travels to the Logistica and they continue to be highlights for the participating growers.

There were three overarching themes that the growers witnessed during their visit. Firstly, there was **a key focus on consumer marketing, encouraging consumers to eat more fruits and vegetables**. This expanded to a diverse range of options, from innovation and fun packaging, particularly convenient consumption sizing and fun options for children. Secondly, **waste-free and specifically plastic-free packaging was a significant focus, with numerous**

sustainable packaging options on display. Third, of course, was t**echnology across all aspects of food production – from mechanical harvesting to protected food production and pest and disease management**.

The group was invited to visit the Rijk Zwaan Retail Centre in Berlin, which simulates a grocery store and maps the consumer's purchase decision journey and preferences through research. Therefore, the company is able to offer its customers tailor-made research options. It was fascinating to see the trend of seed and input producers get closer to the end consumer to understand their needs.

Throughout the Logistica, participants were able to explore new machinery and equipment on display that might generate efficiencies or improve production practices on their farms. Machinery exhibits make up an entire floor at Berlin Fruit Logistica, with growers stunned by the size and scale of the exhibition space, particularly as some stalls featured fully-functioning machines to demonstrate how the technology worked.

The Australian delegation was particularly interested in the latest machinery and technology in salad washers and driers, automated robotic farm technology for both on-farm and for packaging/processing/sorting, and the latest innovations in automatic weeding. Visiting international exhibitors displaying these technological innovations was a great opportunity for the growers in the delegation to discuss the specifics of the machinery and assess the viability of its adoption and incorporation on their farms back home. The value of the networks and business connections made during these ad hoc visits may not be immediately apparent in the first few months following the mission, but over time these networks become hugely valuable for growers to investigate the newest innovations and technologies that can be incorporated on farm.

Of particular interest was the latest innovations in product marketing and packaging that were on display from many different companies at the Logistica. There was significant focus on plastic-free packaging options, as well as convenience packaging with an effort to focus on fruit and vegetables for snacking. Product innovations such as 'collective ingredient' packages that include the ingredients for a meal (such as a lasagna, ratatouille or risotto) so that consumers can pick them up in an easy and convenient way and cook the healthy meals at home. The packages also include clear plastic windows so that the consumer can see the produce before they buy it, responding to consumers' desire to be able to see their fruit and vegetables, as well as the recipes that consumers can use to cook their desired meal.

Trend report

Event organisers at the Berlin Fruit Logistica published a trend report that offers fresh insight into how a number of factors are influencing consumer demand, including health, convenience, emotion, ethics, the environment, provenance, seasonality, affordability, visual merchandising and quality.

Surprises in Store is based on one of the most in-depth fresh produce consumer surveys ever conducted, research that involved almost 7,000 consumers in 14 different markets across Europe and North America.

Fruit Logistica Innovation Awards

An important component of the Berlin Fruit Logistica is the Fruit Logistica Innovation Awards, which acknowledge the most innovative and ground-breaking advances and technologies that are taking place in the global fresh produce industry. This year's nominees and winners were awarded to highly-deserving candidates. The delegation had the opportunity to see the finalists at the trade show, which provided them with another avenue into the latest innovations in the global fresh produce industry.

The "Oriental Red® – red kiwi fruit" from Jingold in Italy won the top prize. Originally from China, the red Dong-Hong kiwi not only has unique organoleptic properties, but also boasts an excellent shelf life. As well as the fiery red colour of its flesh, trade visitors also commented on the fruit's extremely pleasant, sweet taste. With a sugar content of 20 to 21 degrees Brix, the Oriental Red® – red kiwi fruit leaves an exotic aftertaste that enriches the international fruit trade.

Second place was awarded to the "Softripe® Ripening Technology" from German firm Frigotec. Trade visitors were impressed by this natural, energy-saving ripening technology for bananas and other tropical fruit. Softripe® Ripening Technology can help fruit reach consumers at optimum ripeness. Varying the different ripening levels can also improve fruit quality.

The third prize was awarded to the "Top-sealable compostable, recyclable strawberry punnet" from CKF in Canada. With their sealable, compostable and recyclable wood pulp punnets for 350 to 400 grams of strawberries, the

Canadians are leaders in environmental protection in terms of sustainability. The wood pulp punnet not only provides a great deal of protection for the fruit and a view of the product, but also ensures a longer shelf life, without using plastic.

While these innovations may not be directly applicable to the participants' businesses in Australia, having the opportunity to witness the latest innovations across the fresh produce industry was a beneficial experience to get the group thinking more about the innovations that were on display at the Logistica trade show and for the rest of the tour.

Start-up Day

The 2019 Berlin Fruit Logistica ran its first dedicated session to provide 'start-ups' the opportunity to show their businesses to the global fresh produce industry. Focusing on the theme "Disrupt Agriculture", the first Start-up Day event took place on 8 February 2019. The top 20 start-ups, according to the event organisers, were as follows:

Agranimo

Agranimo helps growers increase yields, and importers to forecast production volumes.

Our platform combines sensor data, weather forecasts, satellite and drone images with machine learning algorithms to provide site-specific recommendations and efficiency comparison.

Agri marketplace

Agri Marketplace is a B2B cloud-based digital marketplace for real transactions of food crops. The start-up built a complete digital platform for farmers and Agro-Industry buyers with different added value services: a trade marketplace to buy & sell, with different services included like logistics, quality inspections, secure payments and legal support.

Agritask

AgriTask is an Israeli company, which has undertaken the mission to improve the productivity of agriculture via extensive use of ag-data and advanced technologies.

AgriTask's innovative BI platform & ag-operating system provides an end-to-end management platform for businesses in the agri-ecosystem.

Agroop

Agroop is developing a very scalable technological solution to help farmers to monitor their crop's water needs and to predict risk factors, namely diseases and fungi.

Agtools

AGTools provides real time algorithm deep data services to farmers and industry buyers regarding over 513 commodities of fruits, vegetables, nuts, herbs and ornamentals. The data can offset volatility in the market and improve decision making to increase profitability. Targeting to reduce $350 billion per year worldwide of food waste between farms and distribution centers.

Clarifruit

Leading software provider of next-gen, automatic quality optimization solutions for the Fresh Produce industry.

Clarifruit offers a cloud-based software platform (mobile and web interfaces) that can automatically identify, collect, and analyze real-time data about the fruit/veg external and internal characteristics.

Our big-data repository is the only industry platform capable of analyzing overall produce quality, and is uniquely positioned to derive operational insights to optimize supply-chain processes and enhance revenue opportunities.

Coldhubs

ColdHubs is a social enterprise that designs, installs and commissions 100% solar-powered walk-in cold rooms in farms and marketplaces, to enable smallholder farmers, retailers and wholesalers to store and preserve fresh fruits, vegetables and other perishable food, extending the shelf life from 2 days to 21 days, as such having more nutritious food available in developing countries.

Ffrobotics

Developers of Robotic Fresh Fruit Harvester.

Foodinsights

FoodInsights built dataplatforms for fresh produce supply chains and applications for transparency (tracking & tracing, carbon footprint, performance monitoring etc.), planning (volume & quality) and finance (supply chain finance). FoodInsights supports companies active in the fresh produce supply chains.

Fungialert

FungiAlert increases agricultural productivity and sustainability using disruptive, in-the-field, early detection sensors, facilitating fast and affordable soil and water health testing. Their technology, SporSenZ, samples alive microorganisms (pathogenic and beneficial) which are present in high concentrations, providing for the first time, a realistic picture of soil-health and disease pressures. This information is key for guiding strategic agricultural decisions, such as: evidence based and tailored crop protection strategies; rotational decisions; variety selection; harvest time etc.

Gearbox innovations

Gearbox creates your new colleagues: AI driven grading robots.

Are you looking for a colleague to inspect the quality of your vegetables? Do you want to gain more insight, or do you just want 100% quality control on your grading line? GearVision likes to apply! Your future colleague is a vision and AI driven grading robot, specialized in tomatoes, cucumbers, bell peppers and other vegetables. With GearVision you will work even smarter, more efficient and consistent. Your quality makes the difference!

Impactvision

ImpactVision helps companies increase produce consistency and automate quality control by using hyperspectral imaging technology to non-invasively detect properties such as freshness, ripeness or pH, and the presence foreign objects in real-time. The new avocado application non-invasively determines the dry matter of every fruit in-line so similar maturities can be ripened together.

Inspirafarms

InspiraFarms produces energy-efficient refrigerated storage and food processing plants that meet global food certification standards and operate on and off grid. It is a on-farm turnkey solution that help to reduce produce losses, cut energy costs and improve market access. The package includes remote monitoring systems that provide performance analytics to clients and market information to the food industry.

Logic26

Logic26 GmbH develops and supplies IoT sensors for the agriculture sector. To maximise energy and cost efficiency, Logic26 relies on SIGFOX wireless networks for data transmission. The start-up provides a GPS-based positioning solution with various sensors for recording temperature, operating hours, acceleration and location.

Motorleaf

Motorleaf develops leading automated greenhouse technologies with artificial intelligence (AI). The primary service, automated harvest forecasts for peppers and tomatoes is the world-first and only proven technology to automate harvest yield estimates, producing yields predictions more than twice more accurate than predictions made by humans.

Pats indoor drone solutions

PATS develops autonomous insect control solutions to growers, based on micro drones. With our solution flying insect pests (e.g. moths) are both monitored and eliminated, such that further spread of the pest is prevented. This helps growers to reduce losses and increase quality of their produce. It also reduces the need for (bio)insecticides and the day-to-day labour involved with crop protection. PATS helps growers to focus on their core business: growing beautiful products.

Poolynk gmbh

Poolynk GmbH has developed a digital solution for cross-company load carrier management. Using the poolynk platform makes it possible for a medium-sized freight company to save up to €100,000 a year.

Ripetime

A new product based on novel Intellectual Property that provides real time (24x7) measurement and reporting of ethylene and volatile organic compound levels in cool stores and post-harvest operations. RipeTime surveillance allows post-harvest operators to make meaningful decisions about the quality of their fruit and do deliver produce to market in optimum condition.

SOLHO

SOLHO is a high-tech company that has developed a fully off-grid energy system called SPRHOUT that, using solar power and thanks to novel thermal energy storage system (TES), enables the complete energy self-sufficiency of a greenhouse based horticultural projects.

Suncity

SunCity develops, builds and commercializes Mobile Solar Pumps to help small farmers switch from conventional polluting and costly diesel pumps. Our Mobile Solar Pump is completely free to operate and has no emissions.

Day 6: Saturday 9 February 2019

Weltech Biopower

The group travelled from Berlin to Arneburg, about an hour and a half west of Berlin, to Weltech Biopower biogas plant, one of the world's leading enterprises in the field of stainless-steel biogas plant construction whose customers include businesses from the agriculture, food, waste and wastewater industries. The anaerobic digestion plants can be designed to convert any form of agricultural waste to biogas, which can then be converted to power and energy. From food waste to animal waste, any organic residue material can be put through the digestion process. The plant visited in Arneburg was utilising corn waste to create biogas.

The group was provided a tour of the facility and provided an overview of the company and the technology behind its biogas plant. This visit was of particular interest to growers who were interested in converting their food waste into energy and was received well from the group.

Day 7: Sunday 10 February 2019

Travel Day

The group travelled from Germany to Amsterdam.

Days 8 and 9: Monday 11 February 2019 to Tuesday 12 February 2019

The Netherlands

Koppert Cress

The first stop for the delegation was Koppert Cress, one of the world's most innovative vegetable producers. Koppert Cress produces microgreens and has built a brand and marketing campaign that has set them apart as a premium producer that sells to high-end Michelin star chefs.

The Koppert Cress strategy is to create pull by the market as they target 'top' chefs and get them passionate about Koppert Cress' healthy and delicious products. These chefs then demand their traders/providores to obtain this top-end product and brand directly from Koppert Cress – price is rarely a factor as this sector of the market is all about the experience and taste.

Rob Baan is the founder of Koppert Cress and is a passionate advocate for 'Farmacy', communicating directly with doctors against the backdrop of the famous saying from Hippocrates: "Let food be thy medicine and medicine be thy food". These microgreens packed a real punch of flavour in the mouth with their potency

The delegation was hosted by Koppert Cress' Stijn Baan, who provided an in-depth presentation on the company's history and values in producing high quality niche vegetable products. The delegation was also given a tour of Koppert Cress' facilities, having a chance to look at its innovative micro herb production practices and learning about the company's focus on marketing and its different channels to market (all of which are for the food service industry). The group was highly interested on the company's strong focus on marketing and establishing a strong niche market for its unique products.

Rijk Zwaan

The next stop for the day was the global headquarters of Rijk Zwaan, one of the world's leading vegetable seed companies. The delegation was hosted by Rijk Zwaan Export Director Jan Omvlee, who took the group on a tour of the company's facilities, including Rijk Zwaan's proprietary seed technologies, including seed resistance technologies, as well as its seed germination facilities.

Unfortunately photos were not permitted during the tour of the facilities.

BASF

The final stop for the day was a tour of one of Nunhems, the vegetable seed business of one of the world's largest chemical producers BASF, which has a facility in the Netherlands. The group was provided a tour from XXXX, who provided an overview of the company and explained the process for how the company works with growers to trial and develop vegetable varieties that work for growers and customers.

Unfortunately photos were not permitted during the tour of the facilities.

The group was taken to tour the hydroponic research farm facility of Nunhems, where new varieties are tested and shortlisted for progress to market.

Wageningen University

The delegation started the final day of industry visits with a tour of Wageningen University, which is one of the world's leading research institutions for the global horticulture and ag-robotic industries.

The group was first addressed by a researcher of quality greenhouse vegetables, Caroline Labrie, who discussed her team's investigation into taste and quality. Consuming vegetables is no longer just a matter of health.

Consumers now demand not only high-quality, but also tasty vegetables; therefore, incorporating taste in breeding is a significant focus of product development. The Wageningen Research Facility has a whole team and project to research quality and taste preferences for fresh fruit and vegetables. Flavour and taste can be a real competitive

edge for discerning consumers. Caroline gave participants an example of a producer who has marketed a percentage of their crop with a taste satisfaction guarantee, and this particular product is worth 17.06 Euros per kilogram (compared to the lowest price of 2.44 Euros per kilo). Caroline explained growers very rarely talk about taste on their packaging, and it was suggested that our growers should follow the table grape industry and put Brix level on packaging so consumers can decide.

We were graciously hosted by the team and were privileged to see blackberry and raspberry plants under LED and hybridlighting; new and emerging commercial hydroponic crops of pepper and vanilla; and the brand-new structure from an international specialist in the field of poly greenhouses and tunnels, Rovero. This structure is being hosted at the university, and is using a bubble wrap-type skin focused on saving energy.

The delegation was encouraged to ask questions about the latest research taking place at the university, and the hosts and various researchers that the group met during the day were generous with their time in sharing their expertise with the growers and eager to learn about the experiences of the Australian growers on the tour.

Due to confidentiality reasons, photos were not permitted during the tour of Wageningen University.

Monsanto

The tour group spent the afternoon with Robbert Biemmen from Monsanto, who provided a tour of its Dutch facilities and hosted the tour group on farm visits throughout the region. We were taken to their tomatoes glasshouse which is the centre point for showcasing all new, in pipeline and comparative tomato varieties. It was fascinating to see the fit for purpose tomato varieties being bred, for not only different markets, but also different uses like snacking, sandwich, cooking etc.

Some observations that were made during these visits included:

- The focus by these companies on understanding consumer behavior and consumption patterns, and then responding through breeding specific fit for purpose varieties
- Focus on promoting a healthy diet through their products.

With a range of growers from varying production systems, visits to these facilities was extremely educational for them, particularly those that were not familiar with the workings of a protected cropping system.

Day 10: Wednesday 13 February 2019

Travel Day

The group travelled from Amsterdam to Almeria, Spain.

Days 11 and 12: Thursday 14 February 2019 to Friday 15 February 2019

Spain

Visiting Almeria was an experience like no other. The sight of a rolling expanse of white is what greets you from the plane before landing. There are hectares and hectares of white plastic greenhouses – 30,000 hectares to be exact. These are under greenhouse cropping in Almeria, producing every vegetable from cucurbits to solanaceous crops. It is even more awe-inspiring when one understands the soil and topography of the region.

The industry did not exist before 1974. The soil – or rather rock – in Almeria is not conducive for growing. But Almeria sits at a climatic vantage point in Europe and is able to provide winter production for the rest of Europe. Therefore, the farmers have developed a system that has made the soil arable.

Every greenhouse grower has dug out the base of their structure and replaced it with 30 centimetres of soil (brought in from the mountainous area surrounding Almeria). This is then covered with 5cm of organic matter (mostly animal manure) and finally covered with a 10-15cm layer of small stone gravel or coarse sand. This

soil/organic matter/gravel system compensates and counter-acts high water salinity and limited water supply. The greenhouses are sterilised after every crop by covering the ground in plastic and closing the greenhouse to heat it to 60 degrees Celsius. This steams the ground and sterilises the media to mitigate pest and disease pressures. The 'substrate' mix is changed and overhauled every five years.

Growers farm an average of one to two hectares each and the major crops are tomatoes (9,000ha), sweet peppers/ capsicums (9,000ha) and the rest consists of cucumbers, eggplant, zucchinis and melons.
The area boasts 3,000 light hours per year with mild winter temperatures not falling much below six degrees Celsius and the maximum of 20 degrees. The inside of the greenhouses can reach 27-30 degrees by midday which is conducive for fruiting crops, especially vine crops.

Each of our host companies took us to their key growers. Almeria provides the rest of Europe with key vegetable produce during the winter months. AT the time of our visit, the key crops we had the privilege to view were capsicums, tomatoes, cucumbers and eggplant. The density of cropping means that farm hygiene was at an optimum level, with strict biosecurity protocols in place.

Some observations that were made during these visits included:

- Interesting to view was the cucumber crop as it was grown as a canape formed yhrough vines, making it easier to view and hencw, pick.
- Very high quality capsicum varieties that would be comparable to high tech cropping
- The use of biological pest control
- The "creation" of soil for cropping in the arid lands of Almeria
- Water use, as water in Almeria needs to be made potable through treatment

Day 13: Saturday 16 February 2019

Travel Day

The group travelled home in the morning.

U.S.A. Industry Leadership and Development Mission

Tour Lead: Elyse Rosewall

Day 1: Saturday 12 October 2019

Travel Day

Participants travelled individually from Australia to San Francisco, California. The first group met at the airport and travelled to their accommodation in the mid afternoon before the remaining participants met at the airport and travelled to their accommodation later that evening before attending a group dinner.

Day 2: Sunday 13 October 2019

Rest Day and Group Activity

Participants enjoyed a rest day to recover from the long international flight and a group activity of a tour of Alcatraz and Angel Island was arranged for the group. The group had an early dinner and bunkered down for a good night's sleep to prepare for day one of touring the next day.

The group on Alcatraz Island after the guided audio tour of the Alcatraz Federal Prison.

Day 3: Monday 14 October 2019

Acampo and Modesto

The 2019 Industry Leadership and Development Mission began with a bus trip from San Francisco to Acampo to visit the BASF R&D site.

The day started with a presentation from Suren Baliji, Head of Trait Research, who gave us an overview of the BASF company and brand, including the different kind of crops they breed at the Acampo R&D site, and the acquisition of Nunhams in August 2018. He spoke about the role of the team that he leads, the Strategic Crop Team, which is responsible for defining which crops are included in product development years. It takes approximately 10-15 years to breed and develop one seed to prepare a variety that is ready for planting. Seeds are bred for several reasons, but mainly taste of the produce, convenience and health attributes. Receiving feedback from growers through to retailers is an ongoing process that enables them to continuously make changes throughout the breeding cycle. The key crops that are bred in Acampo are:

- Melon
- Tomato

- Watermelon

Next, we heard from Tomas von Loebenstein, Farm Manager at the Acampo site. Tomas gave us a more detailed overview of the Acampo site and the different breeding and planting seasons. He discussed the staffing of the site in both peak and quieter seasons. The crops are planted in the field throughout the summer season and protected cropping (in the form of glasshouses) is used for the remainder of the year. Recently, they have been doing a trial of LED light growing and are getting some great results. They have found that their tomato trials are growing a lot faster under LED lighting.

Tomas took us on a walking tour of the site and showed us where they usually grow the produce through the summer months. Unfortunately at the time of our tour there was limited crops that were growing, but it was still informative to see where they normally plant the crops. The group was able to have a look at a tomato crop and the differing stages of it.

The group looking at the tomato crops with Tomas at the BASF R&D site.

Tomas discussed their use of mustard seeds as a cover crop. The mustard seed creates a vapor chemical that naturally fumigates the soil. BASF has created, and are currently in field testing, 'ecovio', a certified biodegradable polymer based on renewable raw materials. It is a high quality and versatile bioplastic that reduces the labour associated with having to remove the mulch films from crops after harvesting has been completed. They are in the testing phase now, but the result so far has been positive, with the film beginning to break down after two months. They plan to plant a cover crop over the mulch film and if there is no sign of it in spring, they will begin using it each season.

After the site tour the group enjoyed a hosted lunch with majority of BASF staff from the Acampo site.

BASF, Acampo staff after a hosted networking lunch for the tour group.

Next the group were met by Eric Baysinger, District Sales Manager – Northern California, from Toro, a leading irrigation company, who led the group to the next farm visit, Ratto Bros. in Modesto. On the way to Ratto Bros., Eric showed the group an almond farm that was irrigated using Toro products, predominately drip irrigated. Eric talked the group through the benefits of this type of irrigation and the management of this system.

Eric Baysinger discussing irrigation with the group.

When we arrived at Ratto Bros. we were met by Sales Manager Angelo Grant. Ratto Bros. is a medium-sized farm established in 1905 and has grown vegetables in the region for decades. Ratto Bros. farms one thousand acres of land in the San Joaquin Valley, home to some of the most fertile soil in the world. Ratto Bros. grows more than 70 varieties of herbs, leafy greens, fruits and other vegetables throughout the year. They plant the finest hybrid seeds available and take weekly soil samples, which they monitor at their in-house lab to increase quality and yield.

In addition to the use of the best commercial fertilisers and soil amendments, Ratto Bros. has developed its own composting operation. Not only does this help them better control the way they enhance soil fertility, but they believe it is a more environmentally responsible way to farm. To minimise damage and blemishing, Ratto Bros. handpick all their produce and pack it right there in the field. This allows them to more rapidly transport their harvest to their on-site cooling facility. Ratto Bros. showed the group its 70,000 square-foot cooling and packing house located just minutes from all their fields. The facility allows them to more effectively establish and maintain the cold chain. The technology includes hydro, vacuum and forced air cooling methods. Ratto Bros. has recently invested in solar power technology enabling it to power its entire cooling and packing house using only solar power.

Angelo Grant, Sales Manager, Ratto Bros. explaining the farms irrigation system to the group.

After the tour of Ratto Bros., the group headed to Monterey where they enjoyed a nice group dinner together in the wharf precinct.

Day 4: Tuesday 15 October 2019

Salinas Valley

The group travelled by bus from Monterey to Salinas, the salad bowl of America. The group stopped at Tanimura & Antle for a tour of its facilities before heading to Rio Farms and King City Nursery.

Tanimura & Antle

The group arrived at Tanimura & Antle and was met by owner Brian Antle. The group was provided a tour of some of the production fields and facilities of the company, including a demonstration of its PlantTape technology and other innovations that the company employs in its vegetable production.

Tanimura & Antle purchased the PlantTape technology from a Spanish company in 2014 and has been developing it and commercialising it in the United States. The technology is not yet present in Australia due to biosecurity restrictions. The PlantTape system is an automated planting system that aims for increased efficiency and productivity with seedling planting. The seedlings are placed in a tape that is fed through a tractor which can plant the seedling directly into the ground. Its average speed is around 5-6 miles per hour, but can go up to 10 miles per hour, much quicker than other modes of planting. At the time of the tour, PlantTape was commercially used for lettuces, broccoli, cauliflower, celery, onions, tomatoes and cabbage, with some other crops on trial.

Some areas of discussion during the visit included:

- T&A is 100 per cent vertically integrated and has growing operations in Salinas, Huron and Yuma that enables it to produce fresh produce 12 months of the year. They export approximately 5% of their produce.
- PlantTape – the group was shown the PlantTape machine and given a demonstration of the how PlantTape works, as well as Brian detailing each part of the machine in detail. Unfortunately they had finished using PlantTape for the season we weren't able to see any crops that had been planted using the technology. At the moment T&A use PlantTape on around 50,000 acres of their farm.
- The group witnessed romaine lettuce harvesting. The produce was harvested, packaged and boxed in the field, saving money with regard to labour and infrastructure. It takes approximately 2 hours from the time the produce is harvested to it arriving in their coolhouse for storage.
- Farmers who grow for Tanimura & Antle have access to pooled resources in chemical supplies and application to reduce costs.
- The sheer size and scale of the coolhouse was impressive. The coolhouse that we saw was transporting 1 million boxes of produce per week and operated 24 hours a day. The café where the group had lunch was built for the high number of drivers that visit the facility every day.
- Tanimura & Antle has made a considerable investment in housing and other services for its workers as a

result of the housing affordability and accessibility issues in Salinas. The company has spent over US$17 million to create a housing complex for around 800 workers, keeping the costs of rent and other facilities down as low as it can to ensure their workers are able to save money. Aside from 3-4 bedroom apartments (which are also able to house workers' families if they pay for the additional family members to stay), there is a shop, laundry facilities, recreational areas and sporting fields that are available for workers, along with a bustling social community that engages staff within the workplace culture.

- Brian discussed succession planning and that 30 per cent of the company is now owned by its employees. After a pre-determined length of service at T&A every full-time employee earns shares for every hour worked. He explained that due to the US inheritance tax, the Tanimura & Antle families were no longer able retain 100 per cent ownership of the company so had to come up with something that was going to be sustainable in the long term.

Tanimura & Antle Romaine Lettuce Field.

Participants inspecting the harvested Romaine Lettuce heads.

T&A staff harvesting and packing the Romaine Lettuce crop.

Brian Antle taking the group on a tour of the packing and cold storage facilities at T&A.

Various T&A produce orders ready to be collected.

The participants then enjoyed a quick lunch on route to Rio Farms and King City Nursery.

Rio Farms/King City Nursery

The group was provided a tour of some of King City Nursery's production sites, however most of the production was finished for the season so the group had to use their imagination. After that the group was shown around Rio Farms' by Onion Production Manager Laurie, who showed the group the processing and sorting sheds for their onions. Some areas of discussion included:

- King City Nursery grows seed for its own farm and for other farms, and includes a wide variety of seedlings, including peppers, celery and brassica.
- King City Nursery's Jeff Pereira was able to show the group the seeding machine and described the various stages and parts of the machine. Geoff also showed the group a few the greenhouses they use for production, some of the greenhouses use infrared heating. In total they farm approximately 600,000 square feet of land within Salinas.
- King City Nursery currently output 900 million plants a year, they has doubled its output in four years. Geoff explained that they have seen large growth because many of their customers have chosen to transplant their crops rather than direct seeding as the price of seeds continues to increase.
- Some of the major pests and diseases they deal with in the Nursery are Aphids, Psyllid, Slugs and Leafminer.
- Rio Farms had finished its harvesting for the season so there wasn't anything to see in field. However, Laurie walked the group through the onion sorting and packing shed and the site manager there gave the group an overview of Rio Farms.
- They process 26-30 truckloads of onions in one day through the facility. This is the equivalent of 135,200,000 pounds of onions a year.
- They farm approximately 2000 acres and have one rotation per year.
- There was a big focus from the Rio Farms team on farm safety, food safety and quality assurance – this included requiring visitors who walked on the fields and the processing facility to wear long pants and shirts covering their bodies and hats/hair nets and no jewelry.

Jeff from King City Nursery talking to through group in one of their cool rooms which is packed ready for collection.

King City Nursery.

A truckload of Onions heading into the processing facility at Rio Farms.

Onions are hand sorted for quality at Rio Farms.

Sorted Onions, waiting to be transported into the cooler. Onions have a 5-7 month shelf life when stored in a cooler.

The group at Rio Farms. Safety is a high priority.

After the tour of Rio Farms the group headed to their accommodation in Fresno after a long and busy day.

Day 5: Wednesday 16 October 2019

Fresno and Bakersfield

The group travelled by bus from Fresno through Bakersfield and onto Anaheim for the Fresh Summit Conference. The group stopped at Corteva Agriscience R&D Site for a tour of its facilities before heading to Bakersfield to visit the site of Bolthouse Farms.

Corteva Agriscience R&D Site

We were very lucky to have the opportunity to visit the Corteva Agriscience R&D site in Fresno and our hosts and their roles included, Julian – Applied Entomologist (insecticides), Brandi and Harumi – Predictive Ag and Aaron – Research Farm Technology. We began the tour with a round table discussion about the issues that the growers face in Australia.

The role of the Fresno Research and Development Centre is to characterise new crop protection products, traits, and application technologies through field, lab and greenhouse trials.

- Insect, Weed, Nematodes and Crop Disease Management
- Nitrogen Management
- Agronomic and Input Crop Traits, Seed Applied Technology
- Application Technology

The site farms 160 acres at the center, over 30 permanent crops and a variety of different crops annually depending requirements of the industry. A large diversity of pests are present onsite, more than 40 economically important insect pest species, more than 14 important natural enemies (parasitoids and predators), over 35 economically important weed species and at least 15 economically important plant diseases. The center collaborates with other scientists from across the globe, with many scientists completing internships with Corteva Agriscience. Typically, they have a lot more trials taking place in the summer months so staffing is higher during this time. The below is a snapshot of the different areas of discussion and what the group viewed onboard the people mover that transported the group around the site.

- The center has several tractors, machines and irrigation solutions that mimic, imitate and emulate any growing situations that farmers would find on farm to enable them to offer integrated solutions.
- Corteva Agriscience has released a 24digitised farm management system that incorporates Granular, Encirca and AcreValue Systems. This farm management software is currently only available in the US and Brazil.
- The center uses insect monitoring technologies. Through machine learning it works by testing and storing insect movements and moving patterns to identify what pest it is.
- Julian discussed the centre's use of Artificial Intelligence and more specifically by their use of trapping devices in field. Through this technology it is possible to trace back to the day and time that the pest appeared.

Incubated citrus pest trials in the Corteva lab.

Participants boarding the Corteva people mover. This was after a demonstration of their drone and AI technology on farm.

Romaine Lettuce trials, every two beds are at different stages of growth.

Participants on board the Corteva people mover, Julian is talking to the group about the different trials currently happening within the various fields.

Testing is always conducted at extremes at the Fresno Corteva R&D site, this is a 20+ year old apple orchard which has survived many harsh trials. Julian explained that everything that is trialed onsite is destroyed onsite to minimise the risk of pests and diseases spreading outside the site.

The participants viewing more trials within the glass house facilities.

The group was treated to a lovely catered networking lunch at the center before heading off to Bolthouse Farms in Bakersfield.

Bolthouse Farms

The group was provided a tour of one of Bolthouse Farms' many carrot fields by Aaron Maby, Bolthouse Farms Senior Manager of Grower Services, who spent time with the group to provide an overview of the American carrot market and the production processes that Bolthouse Farms uses for its products. Some areas of discussion included:

- Overview of the company – Bolthouse Farms employs around 2,000 workers and operates 24 hours a day seven days a week. It grows in six separate growing regions across California, from Salinas to the Mexican border, to ensure 12 month supply of carrots. It produces carrots for most major retailers across the U.S. and its products include loose carrots as well as value-added products such as baby carrots, juices and salad packs. The Bakersfield region is a major producer of carrots, with 85 per cent of American carrots coming from the region.

- Less than 1 per cent waste – Bolthouse Farms is able to have less than one per cent of its carrots wasted through the incorporation of value-added products to its product range. This ensures that the company is able to get some return from its second grade produce and is able to provide a wide variety of different products to the market.
- Bolthouse Farms works with other growers in the regions to ensure their fields get the appropriate crop rotation, leasing their farms with their neighbours for them to use while providing a benefit back to Bolthouse Farms. This is particularly important for Bolthouse Farms given it is a single-crop business.
- One of the biggest issues facing the company is water availability and the severe Californian drought, which impacts on its ability to grow other crops and increases cost of producing carrots. This is a common issue with Californian growers, as it was with the group of Australian growers on the tour.
- For the salad carrot variety on which the field demonstration took place, the planting density was 120 plants per square foot, which was very dense compared with what the growers on the tour are familiar with.

Unfortunately, we were unable to have a tour of the Bolthouse Farms processing facilities. The group travelled by bus to Anaheim to prepare for the PMA Fresh Summit which was due to start the following day.

(Left) Participants looking at a carrot crop at Bolthouse Farms, this crop had been planted about 3 weeks earlier. Anthony (pictured) is a root vegetable grower from Virginia, South Australia.

(Right) 3-week-old carrots at Bolthouse Farms.

Jennifer from One Harvest inspecting the carrots at Bolthouse Farms.

Participants discussing carrot production above with Aaron Mabry from Bolthouse Farms and below a group shot with the Bolthouse Farms team.

Day 6 - 8: Thursday 17 – Saturday 19 October 2019

PMA Fresh Summit

The program was a highlight and featured the annual state-of-the-industry address by PMA President Cathy Burns, who spoke during the Thursday morning general session about the top industry trends and opportunities, many of which are being driven by the increasingly sophisticated technology being adapted across the globe. Later that day, Robert Herjavec of Shark Tank imparted his wisdom about entrepreneurship and solving industry issues. That session was followed by a Shark Tank-inspired forum, where four entrepreneurs pitched their ideas to a Herjavec and a panel of judges for the chance to win a $100,000 investment from SVG Ventures in the Thrive Fresh Summit Challenge. ProteoSense, an Ohio-based startup, emerged as the winner for its RapidScan pathogen detection system that increases efficiencies for on-site testing, reducing testing time to 90 minutes or fewer.

Earvin 'Magic' Johnson, an NBA Hall of Famer turned businessman and entrepreneur, spoke during the Friday morning general session about the challenges he faced during his playing career and afterward.

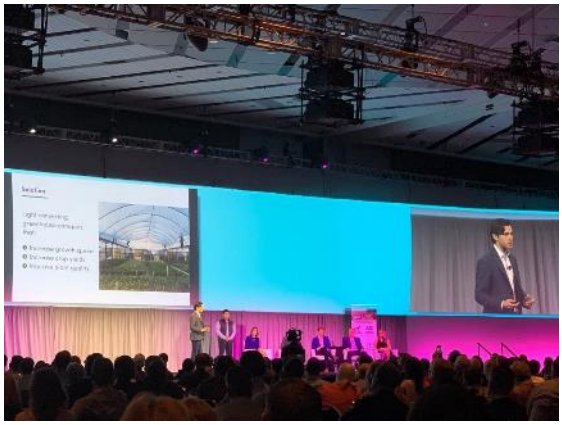
The general session on Friday featured NBA Hall of Famer Magic Johnson, who connected with the capacity crowd and spoke about how he overcame a poor childhood and multiple challenges throughout his career to become a successful entrepreneur and businessman who looks to better underserved minority communities.

The Fresh Summit two-day expo was a standout highlight for all, with nearly 1200 exhibiting companies. The space was huge and with such a vast range of exhibitors to visit it certainly kept the group busy networking and making many new connections as well as learning about various different products and innovations within the industry. With over 24,000 attendees Fresh Summit also serves as an annual reunion of sorts, with industry colleagues reconnecting at various social functions, including the opening reception, which this year featured a global theme.

The group also had the opportunity to attend the Australasian Reception on Thursday night, which was hosted by PMA A-NZ. This provided a great networking opportunity for the growers to meet with an array of individuals from across the supply chain, retailers and other growers from the region to discuss industry issues of mutual concern and create new relationships within the Australasian region.

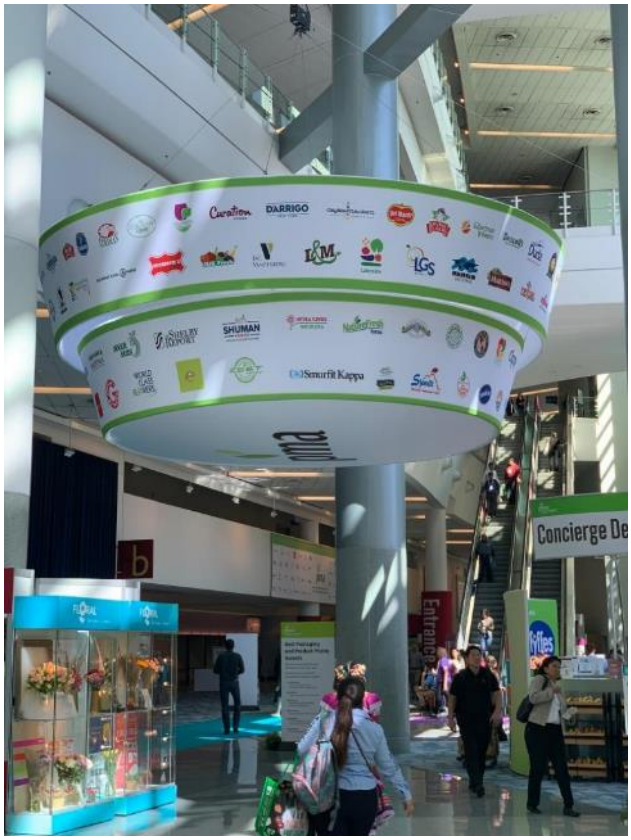
Fresh Summit 2019 and below Fresh Ideas Showcase.

Participants viewing the Fresh Ideas Showcase and below THRIVE Fresh Summit Challenge.



Welcome Reception: Global Street Festival.

Participants at the Australasian Networking Reception with a few other guests including Brian Antle and John Said.



PMA Fresh Summit Foyer.

Sustainable Packaging by Windset Farms.

Day 9: Sunday 20 October 2019

Rest Day and Travel to Yuma

The group enjoyed a restful morning, a time to repack their bags, collect their thoughts and write some notes after a busy three days at the Fresh Summit. The bus collected the group around 1pm where we travelled together to LAX to board the flight through to Yuma, Arizona.

Day 10: Monday 21 October 2019

El Centro, Holtville and Imperial

The group travelled by shuttle bus from the hotel to El Centro where they met with Jeff and Blake Plourd from El Toro Export. Next the group travelled to Vessey & Company in Holtville before finishing the day at the Imperial Irrigation District in Imperial.

El Toro Export and El Toro Land & Cattle

Established 30 years ago, El Toro Export started as a grains company growing Export Hay, Wheat and Feed grains, plus Field Seeds. Today it also owns El Toro Land and Cattle and has the capacity to house and feed 27,000 head of cattle within the 232-pen operation. El Toro Export remains a privately-run company and farms approximately 460 acres of farmland in the Imperial Valley.

Some of the discussion points from the tour included:

- Jeff Plourd gave the group an overview of the company but mainly focused on the grains and seeds side of the business.
- El Toro Export is an industry leader in the handling, processing, and marketing of various agricultural

commodities produced in Southern California and Oregon.

- El Toro Export has extensive operations for the handling, storing, and processing of Hay, Grain, and Seed products.
- Markets served include the Grain and Feed Industries in the Far East, Middle East, Europe, Mexico, and the U.S. marketplace. Japan makes up 60% of the export market.
- Jeff discussed the Alfalfa seed and that China being one of their large export markets have a 0% tolerance for any GMO seed, therefore Monsanto are not allowed to sell GMO seed anywhere within the Imperial Valley. Everything they grow within the valley is 100% non-GMO. This particularly resonated with the organic growers in the group.
- Jeff and Blake gave us a tour of the processing and feedlot plant. El Toro Land and Cattle appears to be a mainstay in the Southern California feedlot industry. Capacities range between 70-160 head per pen, all with specific feeding guidelines predetermined at their processing mill. The mill is a computer-controlled batch mixer with extreme accuracy. Seven rations are available for the well-being of the cattle while maximising performance.
- The feed is weighed into each corral by electronic truck scales. ETLC has a licensed nutritionist and veterinarian on staff. All cattle are individually identified upon arrival and followed through the feeding period. ETLC is a certified feedlot for "Age and Source Verified Cattle" as well as "Vintage Natural Beef", both programs paying premiums for cattle being procured by National Beef Packing Co.
- El Toro Export also have a composting facility onsite which they supply to local organic and non-organic farms. The compost is made of 100% steer manure.

Tour of El Toro Export's facilities.

Jeff explains the bale cutting machine to the group.

Viewing the conveyor belt that the hay bales enter.

Jeff showing the group the wrapping of bales.

Bales have been cut into smaller blocks to be used for feed.

Hay packed in shipping container ready for export.

El Toro feedlot plant.

El Toro feedlot plant.

El Toro feedlot plant mixing station.

El Toro Export Feed Mix.


Each tractor has a computer system inside the cab, just like the computer on the right. The computer includes the recipe for the order and the tray of the tractor is weighted to enable to driver to know how much of each ingredient they have collected as well as having the weight of the mixing bin so they can ensure measurements of the tractor are accurate.

A truck collecting a freshly made load of feed, and on the right, Blake showing some of the ingredients to the group.


Vessey and Company

The group were warmly greeted by Jack Vessey when we arrived at the office. Jack is the 4th generation family member to be involved in the company. Under the management of Jack and his ranch manager Bartt Ries, Vessey and Company has become the premier vegetable operation in the Imperial Valley. Jack now oversees over 10,000 acres in the Imperial Valley for the nearly 100-year-old family farm.

Some of the discussion points from the tour included:

- Vessey and Company, Inc. is a 4th generation produce grower and shipper, located in the Imperial Valley. Their family farm grows fruits, vegetables, hay and grain on more than 10,000 acres. Over 40 different types of fruits and vegetables are grown conventionally and organically.
- Some of the vegetables they grow include cabbage, bok choy, carrots, cauliflower, lettuce, cilantro and romaine lettuce.
- Vessey and Company are not vertically integrated, they grow the produce and the 50% shareholder owner harvests, markets and sells the produce.
- Because the farm is located in the middle of the desert, they harvest majority of produce during the night when the temperature is much cooler, this results in better quality produce and enables them to package it and transport it to the cooler within two hours, keeping the produce fresh and in good condition.
- Jack spoke a little about the irrigation within the Imperial Valley, they receive all their water from the Alamo River. We discussed the irrigation of the region further at our next site visit.
- Jack took us on a tour of a few of the company's sites and pointed out a few the fields that they grow. He also discussed the sandy soil that they have within the valley and how different it is to the soil that we had experienced within the Salinas Valley and Bakersfield.
- Jack showed the group a Hemp farm that they are running a trial on currently. With hemp and cannabis becoming legalised in the U.S.A. it is still a relatively new market but one in which Vessey & Company are committed to trying out.
- Once the tour of the various sites was complete, Jack showed the group back to the office where he had organized a beautiful make-your-own taco catered lunch and we were joined by some of the staff as well a few of Jack's family members. We were certainly very spoilt at Vessey and Company and Jack's hospitality was second to none!

A young baby spinach crop.

Jack discussing the broccoli crop with the group.

Freshly picked baby spinach.

Jennifer from OneHarvest in a trial Hemp crop.

Excellent hospitality at Vessey & Company, catered lunch of tacos and beer for the group – a real treat!

Imperial Irrigation District

To finish off a busy day we travelled by shuttle bus to meet with Vincent Brooke, General Superintendent System Conservation Program Water Engineering Services at Imperial Irrigation District (IID). IID has two core businesses and one overarching mission – to keep the lights on and the water flowing. These two basic functions of IID, both having to do with meeting their customers' essential needs, require extensive planning, teamwork and, above all, consistency.

Vincent started the visit with an hour presentation of the IID and what it does. IID's Water Department has been serving the Imperial Valley's water needs for 100 years. The district provides raw Colorado River water for irrigation and for non-potable residential and industrial use. To facilitate its delivery, IID operates more than 230 miles of main canals, 1,438 miles of canals and laterals of which 1,130 miles are concrete lined or pipelined, and 1,406 miles of drainage ditches of which 107 miles are piped.

With more than 3,000 miles of canals and drains, IID is one of the largest irrigation districts in America. As a public agency, IID strives to provide the highest level of service at the most economical price while preserving the unique ecosystem associated with this working landscape. The IID Water Department is responsible for the timely operation and maintenance of the extensive open channel system, and effectively delivers its annual entitlement of 3.1 million acre-feet, less water transfer obligations, to nearly one-half million acres for agricultural, municipal and industrial use. Of the water IID transports, approximately 97 percent is used for agricultural purposes, making possible Imperial County's ranking as one of the top 10 agricultural regions nationwide. The remaining 3 percent of its water deliveries supply seven municipalities, one private water company and two community water systems as well as a variety of industrial uses and rural homes or businesses. As on-farm conservation efficiency measures are implemented, this ratio will change.

After the presentation Vincent took the group on a tour to view some of the canals and laterals and explained in more detail, the linings, drainage and pipes and the ordering system for their customers.

Vincent explaining the district to the participants.

An irrigation gate within the district.

The group travelled via shuttle bus back to the hotel in Yuma and regrouped for dinner together later that evening.

Day 11: Tuesday 22 October 2019

Yuma

The group travelled by shuttle bus to various locations around Yuma, including Top Flavor Farms vegetable production sites, a hosted lunch at The Garden Café, a tour of the Mellon Farms vegetable production sites and finally to the Yuma Centre of Excellence for Desert Agriculture at the University of Arizona, Yuma Agricultural Center.

Top Flavor Farms

Steve Alameda from Top Flavor Farms met the group at the hotel in Yuma first thing in the morning, before taking the group on a very comprehensive tour of the Top Flavor Farms production sites. Top Flavor Farms is a family owned and operated company with a strong focus on food safety.

Some of the discussion points and areas that were shown to the group are the following:

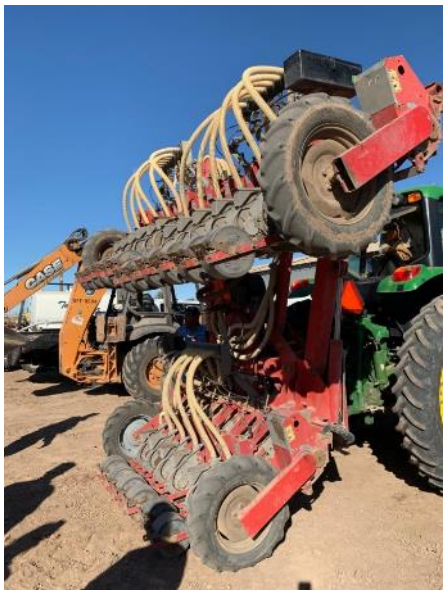
- All Top Flavor Farms crops are planted using an air planter. Steve took us to their machinery yard to show the group the various machines they use on their crops. The machines weren't much different to the ones the growers use in Australia, just on a larger scale.
- Steve explained to the group the way that they manage the crops through thinning of plants. Because labour is expensive and hard to find, they prefer to use an Agricola Italiana machine from Italy to thin the crops, which uses spray technology to identify and kill every fourth plant.
- Steve showed the group the very large tillage machine they use and explained the process. The machine requires a 600-horsepower tractor to pull it and is equivalent to 4-5 passes instead of the regular 15 that is normally required from a tillage eliminator machine. Top Flavor Farms was lucky enough to get $50k funding from the government to help with the investment of this $100k machine.
- Top Flavor Farms didn't have many crops in the ground at the time that we toured through, but Steve did show us a couple of crops that had been planted using PlantTape technology. We were able to view a crop that had been planted 3 weeks prior and one that was planted only the day prior to our visit.
- Steve showed the group Top Flavor's date fields and spoke extensively to the group about the farming of dates within the Imperial Valley region. Because date palms procreate naturally, what started as a niche and in high demand market in the U.S.A. has now become one of oversupply, which means there is little to no profit for the farmers anymore. Steve explained that all date palms that they grow are 100 per cent organic.

After the tour of Top Flavor Farms' various ranches, we headed to a locally owned family run business called 'The Garden Café' for lunch. Serving predominately vegetarian food it was a healthy and refreshing change for the

group. We were joined by Steve's wife Peggy and Cory Mellon from Mellon Farms. Amy Karvoski from Yuma Fresh Vegetable Association joined the group for a short while after lunch to say hi and introduce herself. Amy had assisted AUSVEG to arrange the meetings with Steve from Top Flavor Farms, Cory from Mellon Farms and our final meeting at the Yuma Agricultural Centre at the University of Arizona.

Watching an elimantor in process.

A crop that was eliminated two days ago.



New tillage machinery.

A field that has recently been planted using PlantTape technology.

The group with Steve from Top Flavor Farms within the PlantTape field.

Date Palms at Top Flavor Farms.

Lunch with Cory Mellon (Mellon Farms), Amy Karvoski (Yuma Fresh Vegetable Association) and Steve Alameda.

Mellon Farms

After lunch, the group followed Cory Mellon from Mellon Farms as he showed the group various Mellon Farms ranches, spoke about the history of the company and also showed some of the leading edge technology that they use on farm.

The Mellon Family are third generation farmers. Archie was stationed in Yuma during WWII and he liked it so much in 1945 he decided to stay. He began farming in the Gila Valley and over the years expanded the operations to include the Yuma Valley. Archie had three sons; his middle son Doug began farming with his dad as a young boy, acquiring his first farm in 1961. Doug married Pamela Simons from Yuma in 1965. They incorporated Doug Mellon Farms, Inc. in Arizona in 1976 for the purpose of farming. Doug went on to expand the operations to include land in Dome Valley and the Wellton area, as well as the Yuma and Gila Valleys. Doug and Pam have three children, Colin, Todd, and Cory, who have all chosen to continue in the family business. Colin and Todd received their degrees in Agriculture from the University of Arizona, while Cory received his degree from California Polytechnic State University in San Luis Obispo, California. The three sons incorporated Doug Mellon Farms II, Inc. in 2008 and have assumed the management of the operation.

Some of the discussion points and areas that were shown to the group are as follows:

- Mellon Farms is a professional, full-service farming corporation. They have the capability to grow customers crops as specified the customers growing/harvest schedules.
- Their produce-growing season begins in August, with harvest from November into May. With their county-wide land coverage, they have the ability to meet the customers produce needs in Yuma County. They place each of the customers crops at a location with the proper microclimate to insure high quality, high yields and a successful harvest.
- From Spring through to Autumn they grow melons and forage crops, wheat and cotton. Seed crops are grown year-round.
- Mellon Farms has over 6000 acres spread out over the Yuma Valley, Gila Valleys, Yuma Mesa, Dome Valley, Wellton and Tacna with the ability to gather additional land as they need.
- They operate a fleet of heavy and light tractors, many of which are GPS-driven. Mellon Farms prides itself as being a state-of-the-art growing operation. All supervisors are remotely linked to a central network and data sharing server for easier communication and information sharing. We were able to view a GPS tractor that was making 42 inch beds at the time to prepare the field for seeding that would take place in the coming days.
- Cory spoke extensively about food safety within the company and noted that food safety as well as labour remains to be their two biggest challenges.
- The final field that Cory showed the group was being thinned at the time so we were able to see an Eliminator in action. They transplant three plants every 11 inches of soil. When they are ready to thin, they generally eliminate two plants and keep one. This concept seemed wasteful to the Australian growers due to the cost for seeds and plants, but for the US farmers it was cheaper than having to have a worker manually checking each plant to make sure it has germinated and risk falling short on their agreed yield. This way they feel they have much more control and can guarantee their yield to the customer.

GPS Tractor making 42 inch beds.

Underside of eliminator machine.

Dye in eliminator spray for accuracy.

After the tour of Mellon Farms the group boarded the shuttle bus and headed for the University of Agriculture to meet with the Yuma Centre for Excellence in Desert Agriculture.

Yuma Centre for Excellence in Desert Agriculture.

The Yuma Center of Excellence for Desert Agriculture (YCEDA) is an innovative public-private partnership that connects top scientists to the desert agricultural industry. Its work focuses on high-priority issues identified by industry stakeholders, including (but not limited to) increasing production efficiencies through disease and water management, crop yield maximisation, food safety, and technology utilisation.

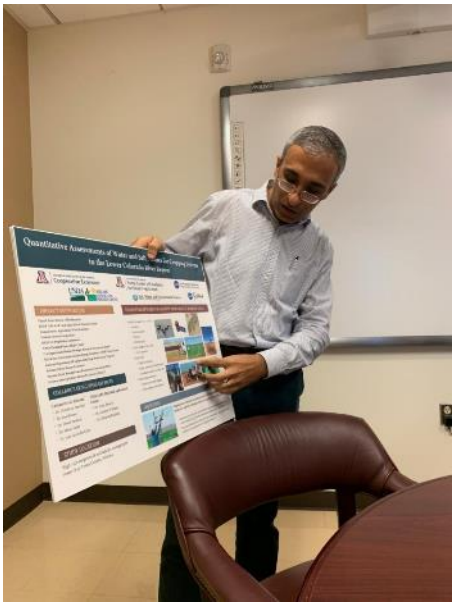
Below are some of the discussion points and areas that were shown during the tour:

- YCEDA have four major programs that they focus on: Research, Outreach, Teaching and Extension.

- Vicki Scott, Food Safety Expert, spoke to the group about the 'Leafy Greens Marketing Agreement'. In short, the goal of the Arizona Leafy Green Products Shipper Marketing Agreement (AZ LGMA) is to ensure that Arizona's leafy greens meet mandatory food safety standards upheld with audits conducted by government-certified inspectors. Vicki noted that it is a voluntary program and it is not compulsory for farmers to become members of the agreement.
- Arizona supplies 50 billion servings of leafy greens into the U.S.A. marketplace every year.
- The group had a tour of the plant pathology lab and were hosted by Dr Bindu Poudel. She explained a few the different trials that were currently happening in the lab to the group.
- Next, we boarded a people mover and Farm Superintendent Burt took us on a tour of the various projects they have in operation in the field. Burt has been with YCEDA for around 30 years so was a very knowledgeable source for the group.
- The YCEDA has around 80 projects that it conducts per season for private industries.
- The group then met with Dr Stephanie Slinski, YCEDA Associate Director, Applied Research & Development. She spoke to the group about some of the trials they are conducting on Fusarium wilts of lettuce and an assessment of water margins and salt balance for cropping systems in desert agriculture.

Dr Bindu Poudel giving the group a tour of the lab and speaking about the various trials. The above is cabbage that is affected by Fusarium wilt.

YCEDA laboratory (left) and Burt giving the participants a tour onboard the people mover of their various trial sites (right).



The group travelled back to the hotel and had a short rest before meeting again for a group dinner later that evening.

Day 12 & 13: Wednesday 23 October and Thursday 24 October 2019

Travel Day and Free Day

Day 12 was a travel day and saw the group travelling from Yuma back to LA via Phoenix. Once the group arrived at the hotel in West Hollywood, LA they had about 2 hours to relax before heading out to the final group dinner for the trip. It was a great night, with lovely food and very enjoyed by all.

Day 13 was a free day and participants were free to do their own activities prior to meeting back at the hotel at 6pm to travel to LAX together to catch our various international flights back to Australia.

European Industry Leadership and Development Mission – Agritechnica

Tour Lead: Shakira Johnson

Saturday 9 Sunday to 10 November

All participants travelled from their home cities to Hamburg International Airport. The group travelled by bus from Hamburg Airport to the hotel in Hamelin, where a welcome dinner was held with all participants at Ka-Wall 32, Hamelin.

Monday 11 November

After a long journey to our destination, participants could attend the preview day of Agritechnica. Most participants opted to attend the preview day. The group traveled into Hanover CBD for a group dinner, where highlights of the preview were discussed and participants strategised for the next three days at the event.

Agritechnica European Industry Leadership and Development Mission participants

Tuesday 12 to Thursday 14 November

The group travelled from Hamelin to Hanover fairgrounds daily to attend Agritechnica.

Friday 15 November

Scheduled rest day. We travelled to a large shopping mall to visit a couple of German supermarkets.

Following our visit to the supermarkets, the group had a free afternoon in Hamelin.

Saturday 16 November

Travel day from Hamelin to Amsterdam.

Sunday 17 November

Rest day in Amsterdam.

Monday 18 November

The AgTech tour of the Netherlands commenced on Monday the 18th of November. The group travelled by coach to an industrial area just outside Amsterdam Central to tour Amsterdam's first vertical farm, a start-up company called GrowX. The company focuses on the idea of local produce, working with chefs to develop and grow microherbs they supply to restaurants in the Amsterdam area. Using renewable energy and circular packaging, the company has a focus on being environmentally friendly and sustainable. The site is based in a large warehouse, shared with local Amsterdam start-up groups. The growing chambers are located inside converted shipping containers, using a special combination of blue and red LED lights. The tour guide took us through the process of germinating seed, energy usage, fertilising and watering processes and how they reuse and recycle each element of production.

Following our visit to GrowX, the group travelled by coach to North Holland to the glasshouse production area known as Agriport to visit the smartfarm greenhouse, Barendse-DC, the world's largest greenhouse for production of orange capsicum. We were greeted by Petra Barendse, one of the owners of the business.

The company uses geothermal energy and natural gas to produce heat, carbon dioxide and electricity. The heat is stored during summer and used to heat the greenhouses in winter, while the carbon dioxide is purified and later used in the greenhouses. Excess electricity is fed back into the grid.

Rainwater is also captured and stored in a large water facility on site. This is then mixed with fertiliser to irrigate the plants in the greenhouses. Petra introduced the group to their biological crop protection strategies, largely focused on integrated pest management with a range of beneficial insects, pheromone traps, parasitic wasps and spiders that are used for crop protection. Information cards about common pests and diseases for the crops were displayed at regular intervals throughout the crops for staff, who are regularly monitoring plant growth and

harvesting capsicums throughout the growing period.

We were introduced to their automation systems, including a smartfarm trolleys and fob scanning processes, which assists with traceability throughout harvest. Staff can monitor how well they are performing based on the time they take to harvest a certain number of capsicums, while produce can be traced to the exact location within the greenhouses it was harvested from and the time and date of harvest. This continues downstream in post-harvest, where the trolleys that automatically follow a track to the washing and packing area of the facility. The company donates any odd shaped capsicums that are not fit for market to Food Bank. We were then invited to take afternoon tea, including coffee/tea, Dutch waffles, a presentation with slides and videos (about history, energy, labour, trade etc.) and tasting of their famous orange capsicums.

Tuesday 19 November

On Tuesday the group travelled to the Hague to tour the facilities at Rijk Zwaan. Rijk Zwaan is a vegetable breeding company that develops vegetable varieties and sells vegetable seeds for commercial cultivation in glasshouses, tunnels, and outdoors. The company offers:

- Eggplants
- Tomatoes
- Cucumber
- Pepper
- Beetroot
- Celery
- Carrots
- Celeriac
- Brassicas
- Endive
- corn salads
- Swiss charts
- Lettuces
- Melons
- Watermelons
- Spinach

It sells its products through locally-operating sales subsidiaries and distributors worldwide. The company was founded in 1992 and is based in De Lier, the Netherlands.

After the presentation we were shown through the facility by Evelien van der Meer – Specialist Sales Support.

For lunch we travelled to Rotterdam Markt, a food hall with a farmers market in the square. The group enjoyed exploring the different fruit and vegetables stands inside the food hall and out in the farmers market, commenting on the quality and pricing of the fresh produce.

We then travelled to Tilburg to meet with the AppsforAgri group. AppsforAgri is made up of a team of software-developers, data analysts, agronomists and meteorologists with a passion for agriculture and app development, making it a unique IT agency. They create software solutions for international companies like Bayer, Syngenta, Friesland Campina, Nutreco and many other players in the agricultural sector. In addition, they work closely with institutions like Wageningen University & Research and HAS Den Bosch.

We were greeted by company director, Corne' Braber, who gave us an introduction to the company and presentation on the various applications they've developed and some of the SmartFarm technology (https://www.smartfarm.nl/) they've created to deliver complete solutions in the field of precision farming ranging

from sensors to management-information to aid farmers in working efficiently and sustainable. The tour participants were very impressed with the simple technology and competitive pricing. Some inquired about purchasing the items for their properties back in Australia.

Wednesday 20 November

The group traveled to Wageningen University to meet with senior entomologist, Rob van Tol. Rob introduced us to his research into the effectiveness of visual traps for plant pests and how to make them more effective. He showed us a demonstration of an experiment designed to monitor insect behavior, tracking time spent moving between food sources and how long it took for them to be attracted to certain colours and brightness. He then gave us a presentation on his research, showing us some preliminary results and accepting questions from the tour participants. We then had lunch at the university café, which used to be used for behaviourial experiments around food choices.

Following lunch, we travelled to Barendrecht to visit The Greenery, an international sales organisation for fresh fruit and vegetables. The Greenery is owned by the Coforta grower cooperative, supplying fresh fruit and vegetables to supermarkets, wholesalers, caterers and the processing industry all year round. In order to be able to supply to customers all year round, they work with growers and cooperation partners from both within the Netherlands and internationally.

They have a unique system for pricing, with a focus on ensuring a fair payout price to growers and offer them flexibility in pricing, with an offer to secure continuity in the purchase of their product by entering long-term partnerships with our customers. They develop innovative products, packaging and shelf plans based on expertise and market research. In addition, they engage end users through consumer panels, translating the consumer's wants and needs to seed breeders and are represented in sector and branch organisations.

The Greenery has a fully automated logistics infrastructure combined with loading options, from the growers themselves and two modern distribution centres – products can reach the shelves within a day from the field or greenhouse. They have a sophisticated tracking system that provides insight into all stocks, transport flows and even current point-of-sale checkout information from customers. This leads to a more accurate process, less loss, shorter delivery times and more importantly, fewer empty boxes.

The tour participants were really impressed with the growers' cooperative, particular the pricing structures and traceability of the product.

Thursday 21 November

The group visited World horti Centre, which is the knowledge and innovation center for international greenhouse horticulture. This hub of collaboration is also the main innovation center of the international greenhouse horticulture sector, where business, research, demonstration, teaching and education converge, as well as providing a focus for greenhouse companies to do business.

World Horti Center is a learning environment for 1,200 senior secondary and higher vocational education students, modern research center for technology, cultivation systems, crop protection and breeding and a year-round exhibition with more than 100 leading horticulture businesses.

The next stop for the group was a short drive to Monster to visit Koppert Cress the group was blown away with the high quality and standard set throughout the entire Koppert Cress facility.

Koppert Cress produces microgreens and has built a brand and marketing campaign which has set it apart as a premium producer. It sells to high-end Michelin star chefs and has left no stone unturned in marketing and providing a 'Cressperience' to anyone who visits its operation.

The tour at Koppert Cress, hosted by Jens Baan, began with a tasting session of their cresses with a magnificent glass of tea. The group tasted an assortment of produce and was amazed at the amount of flavour which could come out of such a small sample.

After the tasting session Jens took the group on a tour of the facility greenhouse. The group was impressed with the level of automation and the efficient heating and cooling system utilised within the greenhouse. Every step in production at Koppert Cress has been planned and analysed to ensure the produce is of the highest quality, and is consistently produced.

The technology was amazing and it is a great family company where staff are provided a healthy lunch every day.

In the evening, the group traveled to De Kas, an ex-government greenhouse research facility converted into a restaurant.

Outputs

Since the completion of the three Industry Leadership and Development Missions, AUSVEG has encouraged participants to share information on what they have learnt and experienced with their colleagues and peers throughout their industry networks, as well as ensuring they participate in future industry events, workshops and seminars. Participants have also remained in contact with each other since the conclusion of the mission, where they have continued the discussion on their new-found insights into vegetable growing technologies and emerging trends overseas.

In particular, AUSVEG has actively encouraged participants to share their new knowledge with delegates at Hort Connections 2020. Attendance at the convention will provide access to a diverse portion of the horticulture industry in one place and, in doing so, facilitate the opportunity for participants to engage with colleagues and share their knowledge and experiences.

AUSVEG has published an article about the European Industry Leadership and Development Mission – Berlin Fruit Logistica on page 25 in the May/June 2019 edition of leading industry publication *Vegetables Australia*, the most widely distributed publication in Australian horticulture received by approximately 5,200 industry members. The article was titled 'European mission inspires leading Australian growers'. Articles were also published in the Protected Cropping Australia publication *Soilless* titled 'Fruit Logistica Berlin 2019 showcases new ideas' and 'Focus on protected cropping in The Netherlands'.

Articles will be published in the next edition of Vegetables Australia about the U.S.A. Industry Leadership and Development Mission and European Industry Leadership and Development Mission – Agritechnica. An industry report that focuses on the missions from this project will be published early in 2020.

Where the opportunity arises, participants will continue to be invited to share their experiences at industry seminars arranged, organised, facilitated and/or communicated by AUSVEG and other vegetable industry organisations. The contact details and relationships built throughout the mission will also be used to facilitate future discussions and continue the process of sharing information.

Outcomes

The missions undertaken as part of project VG18002 Vegetable Industry Leadership and Development Missions – 2019 provided Australian vegetable industry members with exposure to the latest in vegetable and horticulture production practices and technologies employed by their international counterparts in Europe and the U.S.A. The mission inspired participants to review the strategic direction of their businesses and investigate improvements in their current vegetable growing operations, while simultaneously identifying new ideas and technologies for implementation in Australia. As leaders and emerging leaders in their own businesses and the wider industry, the missions facilitated the opportunity for participants to learn skills and knowledge to broaden their leadership capabilities and provided them with more confidence to take up leadership positions in the future to play a direct role in advancing the future of the Australian vegetable industry.

Providing networking opportunities for Australian growers is essential to ensuring that the Australian vegetable industry can prosper into the future. Many participants noted that their attendance on the mission allowed them access to many farms and businesses that they would be unlikely to see on an individual level. It allowed participants to gain a stronger understanding of how the vegetable industry is progressing and how consumer demand is being acknowledged and met.

It is expected that the participants will continue to share their acquired knowledge of American vegetable production processes and developments with their colleagues in the Australian industry. Some participants were also required to present findings back to their company upon their return.

Finally, it is important that participants remain in contact with each other as well as their international counterparts. Creating strong and long-lasting business relationships will result in valuable information being shared among Australian vegetable growers for the benefit of the industry.

As a result of levy investment, participants gained a better understanding of the ways they can improve on-farm practices and develop their skills and were inspired with new innovations and ideas to advance and grow the vegetable industry. This reflects a selection of the outcomes identified in the *Vegetable Strategic Investment Plan 2017-21*.

Briefs of specific outcomes from each mission are below.

European Industry Leadership and Development Mission – Berlin Fruit Logistica

Knowledge was obtained by visiting the Berlin Fruit Logistica trade show as well as a range of vegetable and horticulture growing operations, research facilities and agribusinesses across Germany, the Netherlands and Spain. The diverse range of meetings held during the mission provided insights into new and unique business practices that could be implemented in Australia, and inspired participants to further research these opportunities upon their return.

Giving Australian vegetable growers access to worldwide industry knowledge through attending the Berlin Fruit Logistica, as well as visiting Weltech Biopower, Dutch companies Koppert Cress, Rijk Zwaan and Wageningen University, and agribusinesses and growers in Spain's Almeria region offered participants the ability to increase existing industry networks and gain new insights into growing production and technologies and innovations that are being used and researched overseas. The learnings from the mission can be adopted by the participating growers to increase the efficiency and productivity of their growing operations. The widespread dissemination of these learnings can also help ensure that the wider Australian vegetable industry can benefit from the as well as ensuring the Australian vegetable industry is using the latest and most efficient technologies and processes through the dissemination of these learnings to the wider industry.

As many participants were not familiar with protected cropping, they had not been exposed to the different production practices required to grow vegetable under cover prior to the mission. As a result, the mission allowed participants to expand their knowledge on the different production practices and the challenges faced by other growers in the horticulture sector. Many participants were appreciative of the diversity and variety of meetings as it allowed them to broaden their horizons on potential methods that can be applied to different farming systems.

U.S.A. Industry Leadership and Development Mission

Knowledge was obtained by visiting a range of vegetable and horticulture growing operations, research facilities

and agribusinesses across California and Arizona. The diverse range of meetings held during the mission provided insights into new and unique business practices that could be implemented in Australia, and inspired participants to further research these opportunities upon their return.

Some key findings included the potential of automated harvesting and planting (demonstration of the PlantTape technology was a highlight), using more biological additives at planting and building organic matter within the soil, issues with cost and availability of labour in both countries, different methods of preventing pests, diseases and other potential threats to crops, irrigation, increasing efficiency and the importance of understanding the consumer and being able to provide them with a desirable and consistently high quality product. The participants also noted the increasing importance of organics in the United States.

As many participants only grow a select number of product lines, they had not been exposed to production practices for different vegetable and horticultural commodities prior to the mission. As a result, the mission allowed participants to expand their knowledge on the different production practices and the challenges faced by other growers in the horticulture sector. Many participants were appreciative of the diversity and variety of meetings as it allowed them to broaden their horizons on potential methods that can be applied to different farming systems.

Throughout the mission, it became clear that the scale of vegetable production in Australia was different than in the United States; but this gave participants a greater appreciation of how their colleagues in America manage production on a larger scale, the advantages of a steady and relatively cheap source of labour and the technologies and innovations that have been implemented to achieve this feat. It also provided ideas of how participants from smaller growing operations could up-scale and become a market leader in their sector.

The two-week mission also highlighted the important role that research, agtech and automation can play in a vegetable growing operation. Australian vegetable growers should look to adopt as much automation into their businesses as possible, as this will not only help to reduce high labour costs but will also ensure their operations remain as efficient as possible and reduce the possibility of human error and contaminants infiltrating crops. Many growers identified new technologies, such as PlantTape, in-field harvesters and biological crop protection as promising solutions for implementation in the Australian vegetable industry.

During the mission, many participants came across innovative ways to value-add or create an off-farm income and noted the importance of diversifying to remain profitable as a business. In addition, the Fresh Summit Convention highlighted the creativity that some American growers have used to design packaging that is highly appealing to the consumer and meets a unique consumer need. Some of these products were borne purely out of consumer demand, which reinforces that Australian vegetable growers have an opportunity to look more closely at what the consumer desires, especially when it comes to convenience.

Importantly, the mission also allowed participants to expand their local and international business networks and discuss mutual areas of interest. The group consisted of a diverse range of participants representing growers and processors across multiple Australian states and they each held a different role within their respective businesses, from business owners with whole-of-farm responsibility to agronomy, and marketing/new product development. This allowed participants to share and discuss their diverse range of knowledge and experience and ultimately learn from each other over the two-week mission.

The group met many influential growers in the United States horticulture industry throughout the mission and were able to forge key contacts. While the technicalities of horticulture may differ from country to country, many of the overarching challenges and issues – including labour, water access, sustainability, profitability and increasing vegetable consumption – remain the same. The participants relished the opportunity to discuss common issues with international growers and find out the strategies they have implemented to overcome these challenges, and how they could improve areas of their own farms. The participants were very appreciative of the time that these growers dedicated to the visit, their hospitality and transparency in discussing challenges and solutions within their growing operation.

European Industry Leadership and Development Mission – Agritechnica

The 2019 Agritechnica Industry Leadership and Development Mission offered participants the opportunity to build strong networks amongst the diverse group of tour participants. It connected ten Australian industry established and emerging leaders with peers, innovative agritechnology, growing operations and research institutions across Europe, with the mission seeing delegates expanding their leadership capacities while developing a greater understanding of horticulture outside of Australia.

It was recognised that the mission was a highly rewarding and valuable experience that all eligible Australian growers should be encouraged to attend. The Mission also plays a vital role in facilitiating networking in the industry by connecting them with business contacts from the international vegetable industry, as well as with each other, which not only strengthens their own respective network within horticulture but the wider industry. Mission delegates agreed to promote their experiences and insights gained with their peers and have emphasized that the mission was an invaluable experience and learning tool.

The below quotes provide a sample of the feedback received and have been extracted from the evaluation forms.

“An invaluable experience and so grateful we were offered the opportunity to attend Agritechnica, and visit a great variety of locations across the Netherlands”

“Important opportunity for levy payers to be exposed to different approaches, new technology and business models”

“Good variety of industry locations from the Agritechnica expo to seed companies to protected cropping, software developers and new ag-technology”

“Earlier planning would have been better, it was felt very last minute”

“The drive from Hamelin to Hanover every day was long, would have been nice to stay closer to the expo, but understandable that the size and number of attendees limited accommodation options. Maybe earlier planning would overcome this issue?”

“Found the mix of growers very good. Over two-week period found a lot of our issues are common to others in the industry.”

Monitoring and evaluation

The Monitoring and Evaluation Plan for VG18002 Vegetable Industry Leadership and Development Missions – 2019 included the following key evaluation and monitoring and evaluation questions:

1. Has the project been successful in helping improve understanding of the latest research and technologies in the global horticulture industry?
    a. To what extent has the project been successful in helping improve understanding of the latest research and technologies in the global horticulture industry?
2. Has the project been successful in building business and industry networks in the Australian vegetable industry?
    a. To what extent has the project improved the international networks for growers in the Australian vegetable industry?
    b. To what extent has the project improved the domestic networks for growers in the Australian vegetable industry?
3. Has the project been successful in generating discussion and ideas from the participants for potential research that can be undertaken in the Australian vegetable industry to help improve production and profitability?
    a. To what extent has the project generated ideas for potential research that can be undertaken in the Australian vegetable industry to help improve production and profitability?
4. Has the project been successful in helping to improve understanding of the most important issues in the global horticulture industry?
    a. To what extent has the project been successful in helping to improve understanding of the most important issues in the global horticulture industry?

1. Has the project been successful in helping improve understanding of the latest research and technologies in the global horticulture industry?

a. To what extent has the project been successful in helping improve understanding of the latest research and technologies in the global horticulture industry?

All of the tours that were undertaken as part of VG18002 Vegetable Industry Leadership and Development Missions – 2019 increased awareness and understanding of the latest technologies and innovations in the global horticulture industry. These areas are all linked to the five strategic outcomes that are listed in the Vegetable Industry Strategic Investment Plan 2017-2021, which are:

- Outcome 1: Growth in the domestic market
- Outcome 2: Growth in export markets
- Outcome 3: Improved farm productivity
- Outcome 4: Increased levels of post-farmgate integration
- Outcome 5: Improved industry capabilities for adoption and innovation

Below is a brief on the specific areas that each location visited during these tours increased understanding.

- Berlin Fruit Logistica – Latest innovations in food packaging, technologies, seed technologies and innovations, farm and supply chain robotics, food safety, traceability
- Agritechnica – Most advanced and innovative agricultural technologies and robotics

- Weltech Biopower – Most advanced technology in biogas energy, which converts any form of agricultural waste to biogas, which can then be converted to power and energy.
- The Netherlands – Innovative greenhouse and protected cropping technologies, smart farm technologies, horticulture research
- Almeria – Greenhouse production (both high-tech and low-tech), protected cropping
- Fresh Summit – Retail, supply chain innovations and technologies, packaging, consumer trends, business innovations
- California – Ag-robotics, PlantTape automated technologies, industry scale, irrigation, ag-tech
- Arizona – Ag-robotics, energy, water, innovative growing practices, agribusiness efficiencies and industry scale

2. **Has the project been successful in building business and industry networks in the Australian vegetable industry?**
    a. **To what extent has the project improved the international networks for growers in the Australian vegetable industry?**
    b. **To what extent has the project improved the domestic networks for growers in the Australian vegetable industry?**

Not only did the participants on each tour benefit from the networking opportunities at industry events and on-site visits with international industry members, the groups all greatly benefited from the numerous networking opportunities with other members of their mission group. Examples of comments from the participants' evaluation forms confirm the benefits from the many networking opportunities.

- "I really enjoyed the farm visits – talking to the business owners / manager about their business model and how it works (there's many ways of doing it!)"
- "Being able to talk to farmers direct about the issues they have and how they overcome them was a real highlight."
- "I would highly recommend for all growers to do a mission like this as it has been educational and fun at the same time. I made some good friendships and business connections along the way."

3. **Has the project been successful in generating discussion and ideas from the participants for potential research that can be undertaken in the Australian vegetable industry to help improve production and profitability?**
    a. **To what extent has the project generated ideas for potential research that can be undertaken in the Australian vegetable industry to help improve production and profitability?**

The project generated at least 18 R&D concepts and ideas for investment by the Australian vegetable industry to help improve the productivity, competitiveness and profitability of the industry and its growers. These are listed in the Recommendations section of this report.

AUSVEG will connect with Hort Innovation to identify the best ways to further progress these ideas and concepts.

4. **Has the project been successful in helping to improve understanding of the most important issues in the global horticulture industry?**
    a. **To what extent has the project been successful in helping to improve understanding of the most important issues in the global horticulture industry?**

From discussions the mission participants had at global industry events, with growers on-farm and with each

other, they gained greater levels of understanding of the similarities and differences of many issues that affect growers around the world. These issues include: labour, water, energy, pests and diseases, imports, retail prices and efficiencies, consumer demand for vegetables, food waste, plant health, productivity, traceability, ag-tech and robotics.

For monitoring and evaluation purposes, participants were encouraged to share their feedback on the mission and the days' activities during group dinners. Discussions were also held regularly throughout the mission, usually at the completion of each day.

At the end of the mission, participants completed an evaluation form, which reflected their experiences and the value they received from taking part in the mission. The below quotes provide an overview of the feedback received and have been extracted from the evaluation forms from each mission that have been used to evaluate the success of VG18002.

U.S.A. Industry Leadership and Development Mission

General comments

- "The program was overall very informative providing a great platform to learn Agricultural practices conducted by various large farm operations in the USA."
- "The systems such as storing, packing and transport is scaled up manifold compared to Australian farm logistics."
- "The significance and impacts of pathogen outbreak were eye opening."
- "Lessons learnt on food safety, electronic traceability and quality control is a big shift in our thinking to implement in Australia."
- "A great mix of farms tours and activities."
- "I really enjoyed the farm visits – talking to the business owners / manager about their business model and how it works (there's many ways of doing it!)"
- "I had attended a similar mission in 2009 & was very interested to see changes – new products at Fresh Summit and to see new practices on farm."
- "Excellent experience to see large operations in play. Excellent to spend time with other Australian growers to compare information and learn from each other."
- "I really enjoyed the mission, there was a good variety of things to see from farms and how they adapt to their different landscapes and conditions."
- "Being able to talk to farmers direct about the issues they have and how they overcome them was a real highlight."
- "The best part of the mission for me was the diversity of it all. Seeing different farms and operations and their structures, along with meeting and connecting with a range of members within them. PMA Fresh Summit was a great event to attend as I have never attended anything like it."
- "I would highly recommend for all growers to do a mission like this as it has been educational and fun at the same time. I made some good friendships and business connections along the way."
- "I'm fully charged with knowledge, experience and information to spread to fresh produce industry in Australia. There are many things that are relevant and parallel to our production practices which will be implemented immediately on return. Some are instrumental to start new R&D projects."
- "Very satisfying program. The learnings empower us to take enormous knowledge back to our businesses. The coordinated approach as seen in the USA is not a common scenery in Australia. We need to become more open to helping each other to grow the business for the whole of the nation."

California

- "T&A is a very large farm, excellent operation and very friendly people. The business model is interesting where the employees after 6 years get into ESOP system receiving shares. It is amazing that they supply about 80-90% of leafy greens in the USA."
- "Corteva farm tour to view the various special crops incubator trials on the people mover vehicle was a great experience. Precision Ag research to monitor crop diseases is a great technology to implement in Australia."
- "The carrot country was a feast to our eyes. Moving away from Campbell's seems to be a favorable change to Bolthouse Farms in order to focus on real farming."
- "King City Nursery operation including seedlings, growing and storing is very interesting, they produce 900 million seedlings every year."
- "Ratto Bros. Farm was a very large farm, we openly discussed challenges faced by the farmers with regulatory controls in the State of California. Great opportunity to compare organic and conventional farm challenges. Their general farming practice insight showed differences between the two countries."

Arizona

- "Both Steve and Cory are very knowledgeable and innovative farmers. They seem to try different things such as growing Hemp and Dates, quite different to the normal practice."
- "At El Toro Export I learnt about their composting practice and its great to see that the waste from one operation becomes an essential resource to another system eg. Farm application of compost for growing vegetables."
- "IID – The whole irrigation of the area is great, it makes you wonder how we can make better use of available water in Australia."
- "Mellon Farms – huge farm, seems quite stressful to the owner. He lost a huge crop of romaine lettuce due to a disease outbreak and recall."
- "El Toro Export – very professional well-run operation, diverse and making use of all by products – impressive."
- "Vessey & Co was great to see the use of larger bed systems and how effective the flood irrigation works."

European Industry Leadership and Development Missions – Berlin Fruit Logistica and Agritechnica

General comments

- "Great group of diverse farmers who I will stay in touch with. Impressed with how well controlled and appreciative everyone was."
- "Enjoyed every moment of our study tour. It was a testament to everyone's welcoming attitude and commitment to sharing knowledge with other growers."
- "Great learning and networking experience for me, I am fairly new to growing vegetables and I really appreciated being able to attend such an expansive expo alongside great growers who were more than willing to provide advice and support."
- "The tour locations were interesting and Agritechnica was huge, but the most valuable thing I took away as a young grower thinking about succession planning, is the friendships and advice from the more experienced growers in the group. Good to know there are people I can call if I need to chat."
- "Great opportunity to see what they are doing around the world – good to be exposed to such different set ups, helps make you think what is possible and where the potential lies."
- "Good to get away from the coal-face and take in information in such a beautiful location (Europe)."

Berlin Fruit Logistica and Agritechnica

- "As big as it was and as many different stalls and themes as there were, I didn't find it all that relevant as a greenhouse grower. I would have preferred less time at the expo, more time on-farm."
- "I've wanted to attend Agritechnica for many years, so great to finally be able to attend and it did not disappoint. It was hard to balance all the things I wanted see with trade show fatigue."
- "Such a massive event, I wasn't expecting it be so big, but I am happy with what I managed to see and have some good leads and connections to follow up on when I get home."
- "Impressed with the robotics tech we saw, however, it was a little limited- thought there'd be more. Have started the process of meeting an Australian/NZ sales rep for when we get back."

Amsterdam

- "The second week, with the various locations was because it was much more relevant to my business. Also being able to interact with tour members was great. We weren't able to do as much at the expo because we all split off. Good to interact and discuss ideas for improving our business or discuss common issues we face."
- Great diversity of locations, however, Rijk Zwaan and GrowX were a little underwhelming."
- "Saw some very impressive operations and really impressed with how the tours were run, very adaptable and great people management."
- "Was interesting to hear about the visual trap stuff but a bit technical."
- "Get AppsforAgri and The Greenery over to Hort Connections, great initiatives, really impressive."
- "Koppert Cress was rather innovative and very professionally run. Very entertaining and educating."
- "The AppsforAgri technology was great but felt a little bit like a sales pitch (even though I wanted to buy 7 of the things on the spot)."
- "The host at the orange capsicum greenhouse was very enthusiastic and a great tour leader for the location. Appreciated her passion for her produce."

Recommendations

Based on feedback from participants and observations made during the missions, the following recommendations are provided.

- Develop a multi-year project that allows for the service provider to provide more lead-time to advertise industry leadership and development missions, particularly for those over summer when production can be busiest for many growing regions in Australia.
- Introduce compulsory requirements for participants who attend the mission to ensure information and learnings from the tour are better disseminated to the wider industry. This can include short, individual presentations to the group on what the participants' main findings were at the conclusion of the mission (prior to departure), as well as the requirement to contribute to industry communications (magazines, newsletters etc.) and present at one or more industry seminars upon their return to Australia, including at Hort Connections.
- To ensure the mission is beneficial to all parties, include a thorough vetting process for participant selection and ensure the visits organised are well aligned with participants' backgrounds.
- Incorporate more farm visits with growers in the field, which will hopefully provide some useful information on growing practices.
- Where possible, incorporate more packing shed visits and tours of the farm rather than meetings in a

boardroom or discussions with researchers. Growers tend to be more honest and transparent about the problems they face and how they can be fixed, which makes the discussion more realistic for participants.

- Where possible, invite local growers and industry representatives with a broad understanding of the local growing region and key issues to speak to participants on the bus as they travel between meetings.
- Investigate the potential for more grower input on future grower tour itineraries.
- Include, where possible, activities in the itineraries that aim to develop participants' leadership capabilities, whether this is through industry visits or a dedicated leadership expert.

The evaluation form also included a prompt for ideas/technology that would be suitable to submit as a concept to Hort Innovation to be reviewed by the Vegetable Strategic Investment Advisory Panel. Participants' suggestions are outlined below, which can be used by Hort Innovation to generate project concepts for its portal for investment using the Vegetable Fund or other Fund-specific or Hort Frontiers mechanisms:

- Commercialisation of the PlantTape technology for Australian vegetable growers.
- Investigating how the PlantTape technology can be brought to Australia by overcoming biosecurity concerns that are currently impeding its availability in the Australian market.
- The benefits of drip irrigation technology for Australian vegetable farms, including reduction in water use and improved productivity and profitability.
- Continued research into improving soil health and soil restoration.
- Innovation into new vegetable varieties that resonate with local and international consumers.
- Investigate the idea of 'land-sharing' between companies that can utilise crop rotations and increase productivity of their soils.
- Direct seeding and mechanical harvesting of processed vegetable varieties.
- Traceability plans and software development.
- Development of biological control options.
- Flow wrapping options for vegetable products.
- An evaluation and study of bio-degradable mulch plastic in a range of climates/growing regions of Australia. There are a few international suppliers of these but we need to know if they're fit for use in our conditions.
- Investigation of the possibility of a grower cooperative for Aussie growers, including the growers cooperative having control over pricing options and owning the elements of supply chain (logistics, distribution, etc).
- Investigate sustainable energy infrastructure within production systems, linking to other industries to create a closed system that benefits multiple parties, and possibly generates energy for neighbouring communities. Inspired by the geothermal/ water-heat exchange systems observed in the Netherlands.
- Plant breeding research into drought resistant vegetable varieties.
- Research into better marketing of horticulture products to improve veg intake in our rural communities.
- Investment into bridging the gap between young graduates and them being industry ready – better training and education for agronomists in the vegetable industry. Grains seems to have a strong presence in education, need better training for young graduates in horticulture.
- Better communication channels for pest management options in organic production.
- Investigation into mentorship for young growers, including succession planning, business development. Perhaps assess the best way to approach these issues in the growing communities.

Refereed scientific publications

None to report.

Intellectual property, commercialisation and confidentiality

No project IP, project outputs, commercialisation or confidentiality issues to report.

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Appendix

Mission participants

European Industry Leadership and Development Mission – Berlin Fruit Logistica

Name	Company	State
Nicky Mann	Family Fresh Farms	New South Wales
Troy Walker	Phantom Produce	Queensland
Tim Logan	Glenette Produce	Queensland
Rebecca Wilson	Wilson's Farms	Queensland
Stephanie Tabone	Kalfresh	Queensland
Hayden Bogicevic	Coolibah Herbs	Victoria
Ian Lines	Holla-Fresh	South Australia
Nick Goode	P'petual Holdings	South Australia
Chris Cooper	Vee Jay's	Queensland
Zarmeen Hassan	AUSVEG (Tour Leader)	Queensland

U.S.A. Industry Leadership and Development Mission

Name	Company	State
Anthony Abela	Di Fava Farms	South Australia
Jennifa D'Souza	OneHarvest	Queensland
Monika Fiebig	Monika's Organics	South Australia
Andrew Smith	Butler Market Gardens	Victoria
Justin Osbaldeston	Kalfresh	Queensland
Chitra Adhinarayanan	Green Camel Pty Ltd	New South Wales
Elyse Rosewall	AUSVEG (Tour Leader)	Victoria

European Industry Leadership and Development Mission – Agritechnica

Name	Company	State
Sean Croft	Arahura Farms	Victoria
Satish Chand	Coolibah Harbs	Victoria
Carl Walker	Phantom Produce	Queensland
Trudy Cairns	Phantom Produce	Queensland
Coby Badcock	Badcock Agricultural Trust	Tasmania
Peter Hobson	Gippsland Greenhouse	Victoria
Ikebal Patel	Dahegam Fresh Produce	New South Wales

Name	Company	State
Dylan Bellchambers	Badcock Agricultural Trust	Tasmania
Alecia Chew Gak Leav	PN Leav Pty Ltd	South Australia
Michael Radcliff	Rhebanvale	Tasmania
Shakira Johnson	AUSVEG (Tour Leader)	Victoria