Horticulture Innovation Australia

Final Report

2014 Potato Industry Study Tour

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Media summary used with industry publications

The 2014 Potato Industry Study Tour provided nine Australian potato growers and service providers with the opportunity to visit major potato growing regions in the United States and Canada and learn from some of the international industry's largest and most innovative producers.

Over the course of the 10-day mission, the group visited fresh, processed and seed potato growing operations, as well as packaging and distribution facilities, research stations and logistics operators. The mission allowed the group to experience a variety of emerging R&D, and network with international industry leaders.

The mission began in the United States, where the group visited Simplot growers in Boise, the capital city of Idaho. Idaho is one of the largest potato growing regions in the world, producing potatoes for processing and for the fresh market, simultaneously supplying both domestic and international markets. The growers attended a series of large operations and witnessed large-scale harvesting of processing potatoes. The systems used by growers in the harvesting, transportation and storage of potato produce were highly organised to ensure absolute efficiency even with the massive scale of operations.

While in Idaho, the group also visited researchers from the University of Idaho Research Station in Twin Falls. Here, the group learned about various potato pests and their impact upon the Idaho potato industry, as well as the University's efforts to identify and eradicate threats as they occur.

After departing Idaho, the mission travelled to Pasco, Washington, where they visited a highly advanced and efficient seed processing plant run by Syngenta Seeds. Attendees were given a tour of the plant, and were briefed on the processes involved in sorting and distributing seed, including a detailed run-down of the plant's state-of-the-art corn seed producing facilities.

After departing the United States, the mission travelled to Montreal, Canada for a rest day, before heading east to the major potato growing province of New Brunswick.

The New Brunswick Department of Agriculture hosted the group on a visit through facilities run by the Canadian potato industry in Fredericton. Attendance included visits to the New Brunswick Plant Propagation Centre, which is responsible for tuber variety cultivation and storage for the Canadian industry; the Agriculture and Agri-Food Canada Potato Research Centre, where pertinent industry innovations and developments were being investigated; and an Agricultural Certification Services lab, where seed potatoes were being scrutinised for certification standards.

The group then travelled to the New Brunswick 'Potato Belt', a region in the south of the province responsible for growing the majority of New Brunswick's potato produce, where they visited several seed and processed growers, as well as an innovative packaging and distribution facility.

The following day, the group travelled to Prince Edward Island, where representatives from the Prince Edward Island Potato Board provided attendees with a guided tour of the island's potato growing operations and research facilities. The island is Canada's largest potato-producing province, with over one million tonnes of potatoes produced annually. Produce from the island is largely

grown for the domestic market; however, successful and large-scale potato export operations are also in place, and are currently shipping to more than 30 countries.

The mission visited the island's Inspection and Disinfection Station, where quarantine and standards inspections are carried out on all potato produce arriving and departing the island. The group then visited local growing operations, including processed potato, seed potato and fresh potato growers, as well as a packaging operation.

On the final day, the group travelled back to Montreal for their flights back to Australia.

The mission provided growers with an excellent opportunity to learn from their international counterparts and consider future implications for their businesses. Knowledge gained will be communicated back to industry through a range of information delivery mechanisms.

Expected outcomes and how they were achieved

The objectives of the 2014 Potato Industry Study Tour were to increase Australian potato levy payers' knowledge of global potato production by exposing them to potato growing, processing and supply chain operations in North America and to provide Australian levy payers with an opportunity to see first-hand the methods and practices used and implemented by the major potato producing regions of the USA and Canada. The conditions under which produce is grown in these regions are incredibly diverse, and by taking growers to witness operations taking place under unique circumstances, the mission provided them with valuable information and insight into possible approaches and solutions that could be adopted on-farm in Australia.

In addition to these growing and industry principles, this mission also looked to strengthen the relationships between Australian potato growers and their international counterparts, and to expand the networks of people involved with the global potato industry, including researchers, marketers and growers.

By attending international farming businesses and engaging with the processes of the North American supply chain, participants were able to gain hands-on experience with some advanced methods of horticultural production. Likewise, directly interacting with North American growers allowed the Australian industry members to create valuable international networks.

It is expected that the Australian industry members who participated in the mission will utilise the knowledge they have gained from visiting production and supply chain facilities in the United States of America and Canada, and go on to share these insights with the Australian industry.

Feedback from participants was evaluated in order to gauge the mission's success in achieving its objectives. The below quotes have been extracted from evaluation forms completed by participants:

- "The visit to Prince Edward Island was a fantastic day lead by Mary Kay Sonier."
- "It was great to learn about how Potatoes New Brunswick operate and control early generation seed so they can get better yields for processed potatoes."
- "This tour was worth the trip and I have learned a great deal. It is certainly worthwhile to see how things operate in another part of the world."
- "New Brunswick and Prince Edward Island were the highlights."
- "The AUSVEG tour leader did a great job."
- "I would recommend this tour as it was good to see what was going on in North America."

Mission report

Day 1: Melbourne – Boise (Travel day)

Day 2: Boise

Visit to Simplot growers in west Idaho

Simplot runs major operations out of Boise and works with potato growers across the greater state of Idaho, producing fresh and processed potatoes for both domestic and export markets. The major growing areas of Idaho are predominantly arid and dry, with their annual rainfall akin to desert conditions. Accordingly, irrigation is required in order to grow high quality produce, and the majority of water is siphoned from rivers and aqueducts at a cost to the grower.

There are numerous river systems in Idaho which run down from Canada and from mountains in the far north of the state and provide a constant supply of fresh water. The abundance of water from these river systems essentially provides growing operations with all the water they require to run effectively. Considering the massive scale of the majority of the state's growers, particularly those working through Simplot, this large-scale harnessing of natural water resources is impressive.

In visiting Simplot, participants travelled approximately half an hour out of Boise to the Simplot Field Department office in Caldwell. Here they were greeted by Simplot Field Representative Ernesto Villafana, who detailed the day's itinerary and provided an overview of grower operations for that time of the year. As it was just coming into harvesting season, Ernesto informed the group that the majority of produce was still in the ground, and that storage sheds were empty, but that some early harvesting was taking place.

Ernesto also provided a brief overview of the new processing facility which had been set up in Caldwell. It was noted that the new processing facility was a state-of-the-art plant with massive capacity to store and transport potato produce. The technology used in the processing of produce – including advancements such as driverless forklifts - meant that the entire system was both extremely efficient and highly productive, and that the plant was capable of packaging and transporting potato products to the entire USA. Unfortunately, as the plant was still in the process of becoming operational, the group were not permitted inside the actual factory.



Attendees at Simplot in Caldwell, Idaho.

Following Ernesto's introduction, the group was taken to potato fields in Wilder (approximately half an hour's drive from Caldwell) to see large-scale potato harvesting in action. Unfortunately, however, upon arrival in Wilder it began to rain heavily, preventing harvesting from occurring. Ernesto noted that this was unfortunate, as rainfall in the area was relatively uncommon and would put the majority of operations on hold for the morning.

In lieu of viewing potato harvesting, growers were taken to view a nearby storage shed utilised by a local Simplot grower. The shed was quite large, being approximately 100 metres in length and 25 metres wide, and was primarily used to store potatoes for processing. Ernesto explained that once harvested for storage, potato produce would be stacked almost to the roof of the shed, having been transported in on adjustable conveyors to reduce potential bruising and make efficient use of space.

Large ventilated iron tubing would also be laid across the length of the dirt floor, spaced evenly, to assist air flow up and around stored potatoes. This tubing would be connected to a series of large fans, blowing air at high speed in order to encourage circulation. It was noted that air circulation could be monitored from outside the shed and that circulation rates could be varied according to how the potatoes were dealing with external weather conditions. In this way, growers were able to reduce rotting and disease for their potatoes in storage.

Australian growers considered that this form of storage was innovative, but not common practice in Australia. It was noted that in Australia, the majority of potatoes which needed to be stored were simply kept in the ground until it was necessary to harvest them, as soil temperatures usually remain at a fairly stable level all year-round. This was also considered to reduce input costs. Ernesto noted that this was practical for Australian circumstances, but that the scale of potato production in Idaho and the inclement weather during winter months made storage a necessity for their industry.

The group was then led to a nearby field where 'Bondi' potatoes were being grown for processing. Ernesto cut away some of the vines and dug into the soil with a pitchfork, unearthing the potato

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produce which was soon to be harvested. Australian growers noted that yield in the area dug looked to be quite good and seemed to be as productive as yields in Australia. Ernesto noted that the 'Bondi' variety was especially good for processing, due to the size and shape of the tuber; he also noted that the variety itself had been developed in Australia for Simplot growers. Members of the tour expressed that they had not used the variety before, and that it appeared to be a very good crop.

Following the field visit, the group travelled back to Caldwell to view a harvesting operation which had been temporarily put on hold due to the weather. Although none of the gear was in action, it was nonetheless an impressive display of machinery utilised by Idaho growers. Four-row harvesters were being hauled by a massive CAT tractor which was capable of delivering approximately 500 horsepower of pull, as Ernesto informed the group. He explained the system whereby the harvester would be pulled down the potato rows, with an arm delivering produce from the harvester into an open truck driving along side. Utilising this method, the harvester would be capable of running continuously while trucks simply pulled up alongside in order to collect the potatoes. Australian growers noted that this was a logistically impressive process made necessary by the scale of production.



Unearthing 'Bondi' variety potatoes with Simplot in Idaho.

After lunch the group travelled back to Wilder to see trans-loading and sorting processes occur. Ernesto explained that after potatoes were harvested in the field and dropped into relatively small but wieldy transport loaders, they were then brought to a sorting station, where damaged produce or potatoes otherwise unfit for processing were separated from the majority of produce. These potatoes would then be dropped via conveyor into a loading truck for transportation to the processing facility.

The group then witnessed this process in action. Transport loaders rolled into the yard and were backed onto a conveyor. Harvested potatoes were then dropped onto this conveyor and transported to a metal bar conveyor, which separated any foreign material or potatoes of inappropriate size from the rest of the load by allowing them to drop through spaced gaps in the bars. Following this,

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the load was inspected by three individuals, who assessed the potatoes by eye and separated any damaged or diseased produce. All produce from this point would be deemed quality, sent along a final conveyor and dropped into a waiting loader. This loader would be filled to a specific level, accounting for weight restrictions enforced by the state of Idaho, before being sent on to its destination. Australian growers noted that this was an efficient system, both necessitated and allowed for by the scale of operation.

Given that the loading operation alone was staffed by about five employees (not including drivers), the tour enquired as to the average wage of workers in the area. Ernesto noted that skilled workers could be paid around \$25 per hour; however, un-skilled workers were normally paid substantially less than this amount. Growers considered the cost of additional overheads, and questioned whether Simplot growers received any subsidies from government. Ernesto noted that certain schemes were in place for electricity and water usage.



Sorting freshly harvested potatoes for quality and size.

Given that the morning's rain had cleared, the final visit of the day was to a harvesting operation which was taking place in Grandview, Idaho. Here, the group witnessed a four-row harvester reaping a field while loading trucks came and went with harvested potatoes.

On the whole, growers considered that the operations carried out by Simplot were on a far grander scale than was necessary or financially practical in Australia. They noted that while this was enviable, production on this scale in Australia without a thriving export operation running in parallel would likely crash the market. Furthermore, labour in Idaho was notably cheaper than in Australia, and it had been implied that, at least on some level, government subsidisation was assisting the domestic industry.

The aspect of the visits to Simplot growers which participants found most interesting was the efficiency of machinery used by the growers. The majority of Australian growers noted that they used single-row harvesters, which loaded into relatively small catchments. This is practical for Australian growers, but also quite slow. It was noted that if they had harvesting equipment on par

with that seen in Idaho, Australian growers would be able to reap their entire harvest in significantly reduced periods of time, and this would increase efficiency. It was also noted, however, that the cost of said machinery would be significantly more expensive in Australia than it was expressed to be in Idaho.

Day 3: Boise – Twin Falls

Visit to Simplot growers in central Idaho and the University of Idaho Potato Research Centre

Travelling east on the way to the town of Twin Falls, the group was taken by Simplot representatives to an extensive processed potato growing operation in Glenns Ferry run under the name of Black Mesa Farms. The fields at Black Mesa were primarily growing the 'Russet Burbank' variety of potato, which would be used in supplying fries for McDonald's restaurants; accordingly, the potatoes grown needed to be of the highest possible standard.

Upon arrival at the growing operation, growers were provided an overview of the farm's logistical setup. Potatoes were currently in the ground and entering the end of their growing cycle. It was noted that harvesting would occur soon; however, plants had not been killed as of yet, so vines were still present in field.

It was noted that due to the region's climate, irrigation was a necessity, and that rather than utilise centre pivots, the operation had opted to use a sprinkler irrigation system. It was noted that utilising a sprinkler system made it possible to distribute various crop protectants and fertilisers, as well as target specific areas on-farm which may require increased or decreased levels of irrigation. In this way, quality control for potatoes in the ground could be best monitored. However, the system was noted to be difficult to set up, as pipes and hardware needed to be laid down and redistributed in between growing and harvesting.

As the crops were on a raised plateau, the issues of power and water supply were also considered. It was noted that these were two major overheads of the business, as water needed to be essentially bought off the state and pumped up from a nearby river. Although this was not seen as being a major inconvenience due to the abundance and proximity of the water source, it was nonetheless an expensive system to deal with.





Water pumps providing irrigation to local fields.

Expansive operation at Black Mesa Farms.

Australian growers expressed some reservations about the massive scale of horticultural production on display at Black Mesa Farms, which was obviously impressive, but also had foreseeable setbacks. It was noted that running such a large farm would mean more time concerned with organising business logistics, and limited focus on actually farming. This concession would imply a lifestyle change and could also create a disconnect between growers and their land.

Following lunch, the mission visited the University of Idaho Potato Research Centre, located just out of the town of Twin Falls. The Potato Research Centre provides pest and disease research services to growers in Idaho, as well as general industry research where applicable. Here, growers were briefed by Dr Nora Olsen on the varieties of plant pests and diseases experienced by Idaho growers. Many of the diseases which plagued Idaho growers were also noted to affect Australian growers as well, with the exception of the Colorado potato beetle and the Zebra chip vector the Tomato-potato psyllid, both of which were noted to be affecting the Idaho industry to some extent but are not present in Australia.

It was noted that Colorado potato beetle was not a pressing issue for the Australian industry, as research seemed to indicate that the Australian climate was non-conducive as a habitat for the insect pest.

Zebra chip, however, was noted to be an issue which had the potential to encroach upon the Australian industry, having significantly affected New Zealand potato crops over recent years. Dr Olsen noted that the Idaho potato industry was hit by the Tomato-potato psyllid about five years ago, and since then has managed a level of relative control over the pest through attentive vigilance and proper biosecurity.

Following the overview of Idaho disease research, the group was provided a tour of the Potato Research Centre facility. Dr Olsen showed the group cool rooms where samples were kept in storage and at regulated temperatures. For research purposes, the Centre was also capable of undertaking seed treatment, and it was noted that these cool rooms were primarily used for seed storage purposes. Dr Olsen also displayed machinery used in the cleaning of seed potatoes, with potatoes rolled down a conveyor and sprayed under a fine mist consisting of sterilisation agents before moving onto a catchment area. Some of the Australian seed growers noted that they utilised similar equipment in their operations. Dr Olsen then took the group to a greenhouse on the premises which kept live specimens of various potato pests for research purposes.



Study Tour at the Kimberly Research and Extension Centre.

Day 4: Twin Falls - Pasco

Visit to Syngenta Seeds processing facility

On day three the group travelled to the Tri-Cities area of Washington State, visiting Syngenta's major seed processing facility in Pasco. The Tri-Cities metropolitan area consists of three neighbourhoods separated by the Columbia and Snake Rivers: Pasco, Kennewick and Richland. The rural area surrounding the Tri-Cities area consists largely of agricultural production, and industry within the Tri-Cities area largely facilitates the needs of these operations. Conditions in the Tri-Cities area of Washington were also notably similar to Idaho, with the majority of growers operating on massive plots and, due to the dry climate, utilising the water sources of the Columbia and Snake Rivers for irrigation.

Syngenta Seeds runs a major processing and distribution facility in Pasco, providing seeds to all over the United States as well as to some international buyers. The facility processes treated seeds for a large variety of produce, including watermelon and pumpkin; however, the major focus of the facility is the processing of corn for seed. The Syngenta Pasco facility utilises state-of-the-art technology to obtain high quality corn seed, and this served as the major focus of the group's visit.

Attendance at the facility began with a briefing from the site manager, Kevin Lane. The group was informed that the facility was not currently undergoing major operations; however, produce was being shipped off the factory floor for distribution.

The group was then provided with a tour through the seed storage area and distribution floor of the facility. Here, seed was stored in large boxes or stacked bags and itemised on layered shelving. It was noted that for the majority of horticultural products, seed could simply be harvested in-field, and the group enquired as to whether there were specific processes and equipment needed in obtaining seed from grown produce. Kevin noted that this was indeed the case; however, the process essentially consisted of smashing the product and obtaining the seed within.

The tour then moved on to the rear of the facility, where machinery and systems were in place for the large-scale processing of corn-seed. Kevin explained the processes by which corn was harvested for its seed while the group toured each specific location of the facility.

In the first instance, corn would come in on loaders, and be dumped onto conveyors. Conveyors would then transport the produce into a shucking floor, where corn would drop down onto large spinning metal rollers, which would effectively remove the husks.

From here, the corn would be conveyed to an adjacent room where workers would manually sort the material and pick out any unsuitable produce where necessary. It was noted that, despite everincreasing overheads, it was necessary to have this work carried out manually – usually by seasonal workers, as it required understanding and a certain amount of skill.

From here, corn was conveyed to an adjacent building and dropped into large stacks where it was heat-treated, dried and kept for storage. These stacks were approximately two storeys in height and heated by a large and elaborate system of ovens, which Kevin noted had been exclusively designed for the facility. From here, the corn was stored before treatment and distribution.

Kevin led the tour back to the main facility and elaborated on the treatment and vetting steps for seed processing at the facility. It was noted that these processes occurred for the majority of seed coming into the facility, not just for corn, and that therefore their systems were extensively developed.



Seed storage at the Syngenta Seed processing plant in Pasco.



Attendees at the Syngenta Seed processing plant.

Kevin explained the initial process whereby seed coming through for sorting was vetted by eye to ensure consistency. He noted as an example that kernels of sweet corn were visually very different to corn used for processing; nonetheless, it was common for sweet corn kernels to make their way into processed seed loads. As a result, before vetting processes occurred, sweet corn kernels for seed needed to be manually removed in order to ensure consistency. It was noted that this process was tedious and costly, but that until better technologies were developed, it was necessary.

The group was then shown the processes by which seed was sorted according to size and count. It was noted that this process was necessary as it ensured that Syngenta was able to provide consistency in terms of seed quality and seed numbers per bag. The initial seed-sorting was achieved by running seed through large oscillating sieves, which separated seed in terms of size. From here, seed was sorted in terms of quality – this time with horizontally oscillating trays, aided by skilled workers determining high-quality seed from average quality seed. The oscillating trays were considered to be effective in approximately separating seed produce accordingly to quality; however, manual labour was still stressed as essential to ensuring the process was completely accurate.

Kevin noted that the skillset of workers sorting seeds in this manner was very important, as an accurate sorter could save or make the company significant amounts of money. He also noted that seed prices could vary quite substantially (as with some varieties of tomatoes, for example) and that it was of the utmost importance that seed is properly identified, as even relatively small amounts of misplaced seed could cost the company thousands of dollars.

For the most part, growers expressed interest in the tour of Syngenta Seeds, despite it being somewhat removed from their focus on the potato industry. As the majority of attendees dealt with more commodities than just potatoes, it was considered helpful to get a more varied international horticultural insight from Syngenta. The group also expressed that visiting potato processing facilities or growers near the Syngenta tour would have been desirable, given the Tri-Cities area also supports quite a sizeable potato industry.



Seed processing at the Syngenta Seed processing plant in Pasco.

Day 5: Pasco - Montreal Travel day

Day 6: Montreal Rest day

Day 7: Montreal - Fredericton, New Brunswick

Travel day

Day 8: New Brunswick

Visit to Canada Department of Agriculture facilities in Fredericton and potato growers in New Brunswick

The group travelled to the east of Canada, visiting facilities in the province of New Brunswick which were operated by the Canadian Department of Agriculture and the local grower body, Potatoes New Brunswick. New Brunswick is one of the largest potato-growing provinces in Canada, providing produce to the domestic market, as well as for international exports. New Brunswick is also the home of McCain Foods Limited, which has been cultivating and processing potato produce out of the town of Florenceville since 1957. Growing potatoes for processing, seed and the fresh market means that New Brunswick maintains an industry which is particularly diverse and impressively versatile, supported by appropriate representation from an effective grower body.

The group started their tour with a visit to the New Brunswick Plant Propagation Centre in Fredericton, hosted by Dr Khalil Al-Mughrabi from the New Brunswick Department of Agriculture, Aquaculture and Fisheries. Dr Al-Mughrabi provided an overview of the New Brunswick industry, noting that the environment and climate was close to perfect for the large-scale horticultural cultivation of potatoes. It was noted that potatoes had been cultivated in the region for at least 100 years, and that Potatoes New Brunswick operated effectively as a grower body in ensuring the success of the region.

Dr Al-Mughrabi then provided an overview of the New Brunswick Plant Propagation Centre and its purpose within the industry. It was noted that seed certification was of significant importance within the Canadian potato industry and that within New Brunswick, all potato seed needed to be certified in order to be cultivated. Accordingly, it was of equally-significant importance that tubers be nurtured from a strong initial generation of potato. The role of the Plant Propagation Centre, therefore, was to cultivate micro-tuber varieties which could be used for seed. These varieties are then stored them for future use. Dr Al-Mughrabi noted that certification standards for New Brunswick state require seed potato to be grown over eight generations, from 'Pre-Elite' through 'Elites' 1-4 and 'Foundation', before it can be deemed 'Certified'. Accordingly, there was an acute understanding of certification standards at the Propagation Centre, as stock needed to undergo several generations before it could be legally planted.

Dr Al-Mughrabi then showed the group the Propagation Centre's storage and cultivation facilities. Several cool rooms and fridges were set up where micro-tubers were stored in test tubes and small plastic tubs, itemised according to their varieties. The group noted that this was similar to the operation and set up of the Toolangi Research Station in Australia, which also cultivates and stores micro-tubers and mini-tubers for future use and certification. Growers also noted that the certification standard in New Brunswick was both more intensive and more heavily enforced than in Australia. In Australia, it was noted that only four generations needed to be grown before certification could be reached, and that certification was not enforced on all produce grown. Growers considered that certification standards in New Brunswick were therefore admirable.



Potato varieties at the Agriculture and Agri-Food Canada Potato Research Centre, New Brunswick.



Mini-tubers under cultivation at the Plant Propagation Centre, New Brunswick.

The group then visited the Agriculture and Agri-Food Canada Potato Research Centre, which was also located in Fredericton. The Research Centre is run by the Canadian Department of Agriculture to identify innovations and developments for the potato industry. It was noted that, in addition to

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development of higher-performing and more pest-resistant potato varieties, the Centre also conducts research into new marketable traits for potatoes, including taste and colour.

The tour began with a briefing on the breeding program and hybridization methods employed by researchers at the Centre. It was noted that there were multiple reasons that the industry needed a breeding program, and that for the most part, a program was a necessary aspect of targeting consumer needs and desires. It was noted that research into breeding was an involved process, taking into account a range of data including quality, disease control and biochemical assessments, and then using this data to identify beneficial traits on a molecular level. From here, a pedigree program could be developed to map the planned development of a variety. On average, the Research Centre takes about five to seven years to develop a new breed suitable for release to industry.

Following this overview, the group was shown more of the Research Centre's facilities, including tuber collection amenities. It was noted that over 100 tuber variety clones were available on request to growers at a nominal fee, which ensured industry always had a healthy diversity of varieties available if required. The visit to the Potato Research Centre concluded with viewings of field trials taking place on the facility's grounds and of potato seed being categorized and screened for use in trials.



Categorizing and screening seed potato for trials.

The group next visited the Agricultural Certification Services (ACS) lab, also in Fredericton. Here the certification scheme for New Brunswick was considered, and regulatory testing processes for seed were detailed. As certification is necessary for all seed cultivated in New Brunswick, it is of the utmost importance that seed be tested to ensure it is up to certification standards when sold. Likewise, seed exported out of Canada needs to meet certification standards so that international confidence in Canadian seed is not damaged. It was noted that the lab is also sent USA potato seed for testing where applicable.

The group noted that the facilities run by Potatoes New Brunswick were impressive, particularly the Potato Research Centre, where substantial and meaningful research and development was occurring on-premises. Growers noted that the variety collection seemed extensive and practical, and that uptake of the system within the Australian industry would be more beneficial than the somewhat fragmented systems currently in place. Attendees also expressed that they would have liked more time dedicated to touring these facilities.

In the afternoon, the group travelled approximately two hours out of Fredericton to the 'Potato Belt' region of New Brunswick, located in the far west of the state. Here they met with Greg Toner and Jacques Lavoie, also of the Canadian Department of Agriculture, who guided the mission to growing operations in the area. The initial visit was to the seed potato growing operation of Sean Kilfoil and Brian & Leigh Brennan, who provided the group with an overview of their operation before heading out to a nearby field.

Before stepping onto fields, attendees were given a sanitation spray of their footwear and provided with booties to shield fields from potential bio-security threats. Australian growers noted that this was an admirable practice, as it showed an ingrained and acute awareness for disease prevention which would be exemplary to see in Australia.

Upon arrival at potato fields, growers had varieties laid out in front of them in accordance with field lines. Sean, Brian and Leigh noted that their operation produced several types of certified seed over multiple properties, and that they were involved in the development of new trial varieties.



Potato seed varieties on display in New Brunswick.



Checking out harvesters in Canada.

The tour was then taken to the packing operation of Atlantic Potato Distributors, where fresh market potatoes were in the process of being bagged for distribution. Atlantic Potato Distributors run a state-of-the-art packaging operation which delivers high quality produce for the north-American market. The group was provided a tour of the packing operation, witnessing fresh potatoes as they were washed, vetted for size, automatically checked for disease and finally packed into boxes for distribution.

The majority of the operation was carried out autonomously, with manual labour only required for the final step of the process whereby workers would inspect produce being packed to ensure quality, and then stack boxes onto pallets as they were filled. Participants noted that automated disease detection was one of the more impressive systems in place at the operation. The system utilised automatic laser detectors to scan the interior of potatoes as they travelled along a conveyor. If the potato was found to be hollow by the detector, it was automatically dropped down off the conveyor and into waste.

The group also considered that the efficiency and ingenuity of Atlantic Potato Distributors was exemplary. Packaging potatoes in a way that was quick and effective, with considerations for produce marketing as well as export quality, meant that Atlantic Potato Distributors were operating with good practice in minimising overheads and maximising potential profit.

The group next visited the farm of Kevin Floyd, a major grower of processed potatoes for McCain Foods Limited. Unfortunately, as the group was running slightly behind schedule, growers were unable to tour the facilities and instead were only taken to view harvesting machinery utilised by the operation. It was noted that Kevin was one of the largest growers in the region, and accordingly, the machinery maintained by his operation was extensive, including its new loading trucks, multi-row harvesters and storage sheds.

The final visit of the day was to a series of trial runs maintained by the Department of Agriculture in New Brunswick, where the tour was shown new varieties being tested for effectiveness in the local industry.

Overall, the group considered that the New Brunswick visits had provided one of the more worthwhile days of the mission. A great deal of diverse and practical industry information was delivered, the majority of which was within scope to be achieved back in Australia through applying both research and on-farm techniques. However, the day was fairly condensed, and given that some activities ran overtime, the tour generally expressed they would have liked more time to be dedicated to studying the New Brunswick industry.

Day 9: Prince Edward Island

Visit to Prince Edward Island growers and industry

The final day's visits were to Prince Edward Island (PEI), a principally horticultural province off the east coast of Canada. The island is also Canada's largest potato-producing province, with over one million tons of potatoes produced annually. Similar to New Brunswick, soil and climate conditions on the island are ideal for horticultural production. Furthermore, due to the somewhat isolated nature of PEI (a bridge to the mainland having replaced ferries only in 1997), quarantine has provided advantages to growing on the island. Produce from the island is largely grown for the domestic market; however, successful and large-scale potato export operations are also in place, currently shipping to more than 30 countries worldwide.

The grower body on the island is the Prince Edward Island Potato Board, which is made up of 12 directors from the region elected by their peers. The Potato Board operates in areas of plant health monitoring, quality inspection, national and international marketing efforts, representing grower

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concerns to industry and government partners and R&D work. The Potato Board's activities are funded by levy fees collected on the sale of PEI potatoes.

Upon arrival the group met with PEI Seed Coordinator Ms Mary Kay Sonier at the island's Inspection and Disinfection Station. Mary provided an overview of the potato industry on PEI and gave a tour of the Inspection and Disinfection Station. It was noted that all potato produce being imported or exported to the island needed to undergo a standards inspection, and that the Inspection and Disinfection Station was the hub where this occurred. Because PEI is free of many pests and diseases and has a reputation of being of high quality, screening produce for quarantine and standards assurance is seen as an important system for the industry.

When growers transport potatoes for export they have to first come via the Station, as produce is unable to leave the island without approval from the Station. Potato produce is tested at random, ensuring that no low-quality produce can be hidden within large loads. After produce is cleared, the load receives a certification of its quality which is then used as a pass to export off the island. It was noted that this mandatory system, while strict, was by and large supported by growers as a productive mechanism for PEI's greater industry. Mary stated that the Potato Board ran the Inspection and Disinfection Station and considered that the majority of productive growers were happy to see the system in place.

The group was then taken to the processing operation of Willard Waugh & Sons, located approximately twenty minutes from the Disinfection Station. The operation was in the processes of major construction, erecting two large and innovative storage sheds for harvested potatoes. Upon arrival at the facility, the group had their footwear disinfected, a process which continued on each farm as the tour progressed. It was noted that harvesting had not yet begun and farming machinery which was parked on the premises was inspected by growers.

The scale of harvesting equipment was again noted as being impressive, with multiple four-row harvesters and high-powered tractors contributing to the business, despite the fact the area farmed was not overly extensive.

Impressive on-farm machinery was mirrored by the technological innovations being developed for potato storage. Two almost identical facilities were being built on the premises for the purpose of potato storage, each being approximately 25 metres in length and 6 metres in height. The sheds were being constructed with concrete flooring, insulated walls and advanced air-flow systems to regulate temperatures throughout the facility. It was noted that this set-up was more advanced than typical storage sheds, which have traditionally been built upon dirt floors with simple iron or wood cladding.

Airflow systems were to be set-up in a conventional format, with wide iron tubing providing regulated air throughout the shed. However, the system controlling air-flow was noted to be particularly advanced. As temperatures on PEI can reach as low as -30 degrees Celsius, keeping potatoes in storage cool is rarely an issue; however, there does need to be a certain level of temperature regulation and flow to ensure that disease does not fester within the storage areas. It was noted that these storage facilities were to utilise highly specialised air-flow systems, which allowed for sections of the shed to be regulated at different temperatures and air flow levels.

Keeping storage facilities monitored in this way meant that the operation was able to best protect produce, thereby minimising losses.

Group members enquired as to the cost of erecting such a storage facility. It was noted that the facilities had been built at the cost of around one million Canadian dollars per shed, and that certain aspects of the building process had been subsidised by Canadian and PEI governments. Australian industry members noted that the same construction at home would be substantially more expensive when accounting for labour and material costs.





Stamp used to identify inspected produce coming off of PEI.

Innovative storage shed under construction.

The group then travelled to the premises of the Thompson Potato Company, where fresh potatoes were being packed and distributed for domestic and international markets. Here the group met with John Thompson, who provided a tour of the packing facility. As a result of the fact that John was required to use a wheelchair, many of the innovations in the facility were geared towards increased mobility and function. Where these systems were in place, they were highly innovative, with increased productivity resulting from admirable functionality.

The visit began with a display of the premises' storage facilities. While significantly smaller than those visited at Willard Waugh & Sons, the storage sheds were nonetheless substantial for the operation, with efficient systems in place for both the effective storage of potatoes and airflow through stock.

The group then moved to the facility's washing and packing operations. Similar to the facility in New Brunswick, packing machinery was linked by a series of conveyors, which essentially automated the processes of cleaning and sorting. However, in addition to these processes, an automated bagging machine had also been set up to replace manual labour at the final stages of the process. The machine operated on the same principle as a manual bagging process, but had been fitted with what amounted to a large sewing machine to seal bags as they were packed, meaning that packaged potatoes only needed to be moved for distribution following the packing process. John noted that they had initiated the system specifically for their operation, and that it worked well; however, he

also noted that there were occasionally minor issues with failing to efficiently seal bags which were made of denser materials.



Packaging potatoes at Skyeview Farms

The group's final trip was to the seed potato growing operation of Skyeview Farms, where participants visited seed trial runs for the PEI marketplace. The Skyeview operation was run by Alex and Logan Docherty, who provided a tour of field trials as well as machinery kept on farm. It was noted that the operation had been approached by growers from Australia interested in purchasing tractors and machinery which had been developed on farm. It was considered that machinery was cheaper in Canada than Australia, and so it was often financially beneficial for growers to purchase gear from international growers and then ship it back to Australia.

Following the display of machinery, the group was taken to nearby fields. It was noted that conditions and field sizes were very similar to those found in Australia, particularly in Tasmania. While unearthing potato seed in field, numerous earthworms were noted, which was considered a sign of healthy soil and therefore high quality growing conditions.

Day 10: Montreal – Australia

Travel day



Implications for Australian horticulture

From this mission it became evident that the majority of producers in North America were significantly larger, in terms of production, than Australian counterparts. In particular, growers in the US were working on plots which were very large, utilising multi-row harvesters and a constant stream of transport trucks to most effectively collect their loads. Furthermore, supply chain logistics for North American growers were in place to ensure that the market for exporting potato produce was constantly available. Increasing the market for growers means that they have better opportunities and options following harvest; however, it also means that growers need to dedicate time to running their businesses efficiently.

For Australian growers, this combination of large-scale farming and an effective industry supplychain provides a new perspective on the possibilities for their businesses and the challenges in competing with international markets. By operating efficient and productive business practices, and pushing for more unified development on behalf of both industry and government, Australian growers could fulfil the same efficiency of production – albeit on a smaller scale.

The need to implement proper certification and biosecurity standards was also highlighted throughout the mission, and some of the systems in place in North America could potentially be used to develop and improve upon standard practice in Australia. In terms of seed certification, the standards implemented by the Canadian industry were undoubtedly commendable, given that all seed planted needed to be certified, and all seed also needed to undergo eight generations of development before it could reach this certification standard. Compared to the Australian potato industry, this system was both more comprehensive and had the potential to give greater benefits for growers.

For biosecurity, measures implemented both on-farm and throughout industry were also extensive – especially so in Canada. Quarantine procedures such as those found at the compulsory inspection station on PEI provided industry focus on the value of producing potatoes which are free of disease, while on-farm methods such as disinfectant foot-baths directly combated the spread of pests and diseases, and demonstrated grower understanding of the value of combating biosecurity risks.

These implications are wide reaching and indicate how and where the Australian potato industry needs to develop in order to be truly competitive on an international scale. Advancements will require unity on behalf of the industry and an increased focus on R&D in order to ensure that productivity standards are capably met.

How the information gathered will be disseminated

AUSVEG has strongly encouraged participants of the 2014 Potato Industry Study Tour to share information on what they learnt and experienced with their local counterparts and through their industry networks across Australia. AUSVEG has also encouraged the participating growers to share their new knowledge with growers by actively participating in industry events, such as upcoming seminars. Growers' attendance at these events will provide an opportunity for them to access a large section of the industry and engage in the sharing of industry knowledge.

AUSVEG will publish an article in an upcoming edition of *Potatoes Australia* indicating the outcomes of the mission through covering the major findings and events as experienced by participants. The magazine is distributed to approximately 3,000 industry members. AUSVEG has also featured numerous articles on the mission in its *Weekly Update* e-Newsletter, communicating information from the event to approximately 4,000 industry members.

AUSVEG personnel have also featured information about the mission in presentations delivered at industry meetings.

Itinerary

August 12	Melbourne – Boise			
	Fly Melbourne to Boise (via Los Angeles & Salt Lake City)			
	The group will depart Melbourne at 9:10AM and arrive in Boise at 2:28PM, with stopover in Los Angeles and Salt Lake City. A chartered bus will transfer the group from the airport to the Hampton Inn & Suites in downtown Boise. After arriving at the hotel, tour participants will be given the opportunity to come out for dinner or rest for the night.			
August 13	Boise			
	After breakfast at the hotel, the group will depart to tour potato growing operations in the Boise area, as facilitated through Simplot.			
	9:30AM – The group will meet with Simplot representatives at the Simplot Field Department Office in Caldwell, from here the group will visit Doug Gross Farms, where harvesting and trans-loading will be taking place. Following this, the group will visit extensive 'Ranger Russet' and 'Bondi' fields.			
	After lunch, the group will visit a series of 'Shepody', 'Ranger Russet' and 'Umatilla Russet' fields in Grandview before departing back to Boise for the night.			
August 14	Boise – Twin Falls			
	Today the group will travel from Boise to Twin Falls in Idaho, stopping at growing operations along the way.			
	9:30AM - The group will visit a 'Russet Burbank' field at Black Mesa in Glenns Ferry. The group will then visit a 'Ranger Russet' field in Jerome.			
	2:00PM - Following lunch, the group will drive to the University of Idaho Research Station in Kimberly, near Twin Falls, where they will spend the remainder of the afternoon.			
August 15	Twin Falls - Pasco			
	Today the group will take an early flight to Pasco, Washington, where they will visit a state-of-the-art Syngenta Seed processing facility.			
	12:00PM – After being picked up by chartered bus from the Airport in Pasco, the group will travel directly to the Syngenta Seed processing facility, where they will view advanced technologies employed in sorting and distributing seed for			

	horticultural production.			
	Following lunch on the tour, the group will take a short drive to their			
	accommodation in Richland.			
August 16	Pasco - Montreal			
rugust 10				
	The tour group will depart on an early flight out of Pasco, traveling via Minneapolis			
	to Montreal. After arrival at the Marriott Montreal Chateau Champlain in the			
	afternoon, the group will have the remainder of the day to go out for dinner and explore the city.			
	explore the city.			
August 17	Montreal			
	Today is a rest day. The group will have the day free to explore the city of Montreal			
	at their own leisure.			
August 18	Montreal – Fredericton			
	Following breakfast, the group will take a chartered bus to Montreal Airport and			
	to Fredericton. Upon arrival in Fredericton, the group will have the afternoon free			
August 19	Fredericton			
	Today the group will visit Canadian horticulture potato research facilities and potat growing regions in New Brunswick.			
	At 9:00AM the group will be picked up by a chartered bus and driven to the New			
	Brunswick Plant Propagation Centre, where they will meet with the representative			
	from the New Brunswick Department of Agriculture, Dr. Khalil I. Al-Mughrabi.			
10:30AM – The group will tour the nearby Agriculture and Agri-Food Canada				
	Research Centre, where various industry innovations and developments are being			
	investigated.			
11:30AM – The group will visit the Agricultural Certification Services lab in				
	Fredericton, where Canadian seed is scrutinised for purposes of industry			
	the New Brunswick 'Potato Belt' to visit growers and packing operations.			
	2:00PM – The group will visit the seed farm of Sean Kilfoil and Brian & Leigh Brennan. Here they will view different varieties of potato seed, and the conditions			
	by which they are grown.			
	2.30PM - The group will visit the Atlantic Potato Distributors potato packing facility			
	where they will view state-of-the-art packing and packaging technology in action.			
	4:20DM - The group will tour the form of Kevin Floud who supplies are dues for			
	4.50PM – The group will tour the farm of Kevin Floyd, who supplies produce for			

	processing to Old Dutch and McCain Foods, and is one of the largest processing			
	potato growers in New Brunswick. The group will then travel back to Fredericton for			
	the night.			
August 20	Fredericton – Prince Edward Island - Montreal			
	Today the tour group will get up early and travel approximately 3 hours by chartered bus to Prince Edward Island.			
	At 10:00AM the group will meet Prince Edward Island Potato Board representative, Mary Kay Sonier, at the Borden Inspection and Disinfection Station, where they will discuss the quarantine and protection measurements used to scrutinise potatoes both arriving on and departing from the island.			
11:00AM – The group will take a short drive to the processed potato growin operation of Willard Waugh & Sons. Where they will view advanced storage operations.				
	1:30PM – Following lunch, the group will visit the Thompson Potato company, a fresh potato grower and packaging operation utilising unique and efficient machinery and logistical techniques.			
	3:30PM – The group will visit potato seed producers at Skyeview Farms, where they will view seed growing as it occurs on the island. Following this tour the group will travel to the airport in Charlottetown for their flight to Montreal, where they will spend the night prior to the final day of the tour.			
August 21	Montreal – Australia			
	Today is the final day of the tour. The group will have the morning off to wrap their tour experience, before traveling by chartered bus to the airport at 1:30PM for their connecting flights back to Australia.			

Recommendations

Based on feedback from participants and observations made during the mission, the following list of recommendations has been compiled:

- Attendees generally indicated they found participation in the mission worthwhile and consideration should be given to maintaining similar events in to the future.
- Attendees generally requested consideration be given to the balance between travel and visits, to fully exploit all possible information sources.
- Attendees requested that more time be dedicated to production and research operations in Canada during future missions to North America. Although Idaho growing operations were beneficial to visit, conditions in Canada were far more similar to those found in Australia, albeit with somewhat different industry systems in place.

Acknowledgements

Thanks must go to the growers and business managers who dedicated their time to enlighten and educate attending growers. They exceeded expectations in their willingness to accommodate the group.

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Tour participants list

Callum Murphy	Grower	Victoria
Daniel Parker	Grower	Victoria
Mark Elphinstone	Grower	Tasmania
David Oddie	Agronomist	South Australia
Andrew McInerney	Agronomist	New South Wales
Andrew Campbell	Grower	New South Wales
Stuart Applebee	Grower	Tasmania
Peter Parker	Grower	Western Australia
Steve Childs	Grower	South Australia
Michael Bodnarcuk	AUSVEG	Victoria