

Lucerne Australia USA Tour Report

Introduction

Lucerne Australia is the peak industry body for the Australian lucerne seed industry. The major lucerne seed growing region is in south-east South Australia, within a 100km radius of the township of Keith. This region produces over 85 per cent of Australian lucerne seed. Lucerne Australia is based in this region.

Lucerne Australia has a membership over 130, of which 75 are grower members from this region and other lucerne seed growing regions of Australia e.g. Jamestown and Yorke Peninsula.

The organisation has been considering a study tour to the USA for the past few years, as the USA is not only Australia's major trading partner for lucerne seed, it is also Australia's biggest competitor. Specifically, the Imperial Valley region in California is a region which has a similar growing environment. It is regarded as Australia's major competitor as it produces lucerne with similar dormancy levels, has a "GM free" status and competes in major markets such as Saudi Arabia.

Grower members have been pushing for a study tour to the USA for a few years.

In the Lucerne Australia Strategic Plan (2010-2016), one of the goals is:

- **Strive to develop relationships with personnel in key market and production areas throughout Australia and internationally to promote Australia's lucerne seed industry.**

Following some difficult production years for the industry, Lucerne Australia researched a study tour for implementation in July 2016. The AW Howard Memorial Trust travel grant funding enabled the Executive Officer of Lucerne Australia to travel with the group to the USA study tour to both manage the study tour program and participants, but more importantly gather knowledge of the lucerne seed industry in Australia's major export competitor.

The tour commenced on Tuesday 26 July from Los Angeles, and concluded at Boise, Idaho, on Thursday 4 August. There were 18 participants on the tour. This included nine lucerne seed growers, two agronomists, one rural bank manager, five seed marketers or seed processing managers and Nicola Raymond representing Lucerne Australia.



Figure 1: In a lucerne seed paddock at the Imperial Valley, CA

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Synopsis of Sessions Attended

The program was as follows:

Tuesday 26th July	Los Angeles to Imperial Valley, Southern California
Wednesday 27th July	Imperial Valley,
Thursday 28th July	Imperial Valley to Bakersfield
Friday 29th July	Bakersfield to Fresno
Saturday 30th July	Fresno
Sunday 31st July	Yosemite National Park and Sacramento
Monday 1st August	Sacramento to Boise and Nampa, Idaho
Tuesday 2nd August	Boise and Nampa, Idaho
Wednesday 3rd August	Boise and Nampa, Idaho
Thursday 4th August	Boise and Nampa, Idaho

This tour covered the most significant lucerne seed growing regions of the USA, travelling from Los Angeles to the Imperial Valley, Fresno and Sacramento in California, and to Boise in Idaho. It also included a (Sunday) day trip to the Yosemite National Park in California.

Overview of California from Rabobank

The group met Vernon Crowder - Food & Agribusiness Research Advisory Group at Rabobank. He explained how almonds are California's biggest export commodity by value. This is followed by dairy, walnuts and wine. The dairy industry remains the largest commodity in California.

The minimum wage in the USA will rise to US \$15, from US \$10, won't affect the cities as most are already at that rate, but will impact in the rural communities in places like restaurants. Farming might not be so affected as they will move to more mechanisation.

There are also environmental issues in California including salinity, which is a big issue in the Imperial Valley. There have also been excessive nitrogen applications and this is increasingly being regulated.

"For productive land, values have increased from US \$5,000 to \$25,000 in the past 10 years in CA"

There are orchards that have sold for US \$35,000 an acre but land sales have now slowed and prices are likely to fall slightly as well. This makes it very difficult for businesses to expand.

Rain in California is very volatile, and there is a high dependence on ground water. In their fifth year of drought, which is a record. It is likely that there will be less agriculture in Imperial Valley in the next 20-30 years as the cities in California demand more water. Agriculture must adjust.

In California, about 40% of the water that is used in agriculture is ground water. In the drought, it has increased to 65%. There are subsidence issues, that will recover with new management programs.

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Imperial Valley

At the Imperial Valley on day one, the group met with local growers and businesses.

Watch a history of water in the Imperial Valley: <https://vimeo.com/146459639>

“The Imperial Valley is the most efficient valley in the world.”

Growers here produce small bales of lucerne hay and the hay market is low presently, at a 40-year low. Hay prices have dropped from US \$270/tonne to US \$150/tonne. The first two cuttings are marketed to the domestic dairy industry. From there, the hay is exported to Korea, Japan and China. Late in the season the poorer hay goes to the dry cow market. That hay usually has low protein and feed value due to extreme heat. Growers in Imperial Valley can achieve eight or nine hay cuts per year.

“There is a record number of seed acres in the Imperial Valley presently as the hay market is poor”

Growers here like to diversity with horticultural crops as part of a broader risk management strategy. The produce is almost all under contract. Horticultural crops put more nutrients into the soil so they can achieve greater hay yields. Until recently, lucerne hay has given growers the best return of all the crops produced in the Valley.

Water comes from the Colorado River through a canal system. The Colorado River is currently at record lows. Growers have a “water card” for each field. If a grower rents a field, they receive the water card from the landowner. It is called “on-demand” water.

The irrigation canal system works with each field having a gate number. When the grower wants water on a field, he calls up the authority and it is confirmed a few hours later. The levels of water can be changed by the grower and gate and canal level height.



Figure 2: Irrigation canals in the Imperial Valley

Leafcutter bees are far more effective than honeybees in the field at Imperial Valley. Honeybees are not as effective due to wind, irrigation timings and extreme heat. They had a 118-degree Fahrenheit day in May (48 Celsius) and with wind, the honeybee was ineffective.

Land values vary considerably in the imperial Valley, but good ground can fetch US \$15,000 per acre. There are a lot of absentee landowners – the third generation of farmers who are now living on the

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coast at San Diego or Los Angeles – so there is substantial rented ground. Renting land for more than US \$700 per acre is not unusual.

The landowners do not own the water in the Imperial Valley. It's all held in trust in a public utility. They don't have water rights. Instead they receive a licence to use the water. It cannot be purchased.

a) Imperial Valley Milling Company

The group visited the Imperial Valley Milling Company, which has been servicing the lucerne seed industry for over half a century. They specialise in alfalfas, Bermuda, other forages, HardiCoat seed coating and seed cleaning.

It is run by Glen and Simon Bornt, who also own Kongal Seeds near Keith, in South Australia.

Imperial Valley is the only place in California that is GM-free so all loads are GM tested on arrival at the processor. Samples are sent to a genetic lab for testing, at a cost of about US \$100 per sample. This cost is split 50/50 with the grower.

Yields in Imperial Valley are quite similar to what is achieved in South Australia. The average clean seed crop would be about 400-500kg per hectare. However, clean out rates vary from 20-50 percent.

Golden Dodder is a common noxious weed, common in the Imperial Valley. The percentage of paddocks with dodder is about 15-35 percent as an estimate. The Californian Crop Improvement Association (CCIA) has flown planes over the land this year as it was a bad year with spring and summer rains, and provided growers with photos so they can treat – spray, burn, cut and bag – plants prior to harvest. They also inspect the machines at processing facilities.

b) Jim Ohlan, a major hay processing business in the Imperial Valley

The group met with Jim who highlighted how the main markets for lucerne hay in Imperial Valley – which is GM-free – are the dairy industries in Japan, China, Korea, UAE and Taiwan.

This used to be a fully integrated supply chain business, but they are now focused only on processing. They purchase hay from local growers and much comes out of Arizona, which is all free. They do all the testing and farm records to ensure they meet GM-free regulations. Lucerne bales are double compressed to condense down into shipping containers.

“Everything in Imperial Valley is pretty much GM free”.

This business is receiving 130 trucks of hay per day currently, with 24 tones hay per truck. Outbound, they are loading about 28 trucks a day to a port near Los Angeles, which is about four hours away.

One of the biggest challenges is congestion at port in Los Angeles. This has been slowing down their supply chain efficiency. He blames the unions demanding more for employees and general employment regulations.

This business also has a lucerne pelleting facility with two different sizes – both half and quarter inch – with customers who purchase pelleted lucerne for the chicken industry in Taiwan. They also produce organic lucerne pellets for the domestic egg market. Apparently, chickens that eat lucerne pellets have green coloured yolks and these are considered a delicacy in the USA and in major demand.

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c) KF Seeds

Helen Fifield provided the group with an overview of their business, KF Seeds. They are seeing more seed being produced locally after poor hay prices. Bermuda Seed has been US \$4.00 per kg to the grower as an average. And with yield, 350 pounds clean is an average yield for Bermuda seeds. Spider mite is a challenging pest for this crop but it can be in production for 20 years.

The main customers for Bermuda seed is China, Taiwan, Japan, other parts of the USA, Africa and South America and even Australia. There was a demand from China prior to the Beijing Olympics.

KF seeds both deal with growers directly, and are a third party with major marketers to clean and pack their seed for them. They do less branded products as customers want their own branding.

Discussion about Water

The drought has affected California significantly over the past five years. Less than 15 percent of the normal snow pattern has been received. Some areas had just 8 percent of their normal snow pattern. Groundwater wells have been massively affected. There have been well failures and growers couldn't get a well-driller for up to a year as there weren't enough to manage demand.

About 40 percent of the water in the Central Valley is utilised from groundwater wells. There is very variable water quality. An unstable water supply, and high value crops have still been planted with very little knowledge of whether there will be any water there in 10 years' time.

There are regulatory changes, including rulings that are linked to the endangered species act, that demand pumps be turned off due to issues with salinity and issues with fish being pumped through the systems. This forces growers to rely on groundwater wells that have subsistence issues. There is no groundwater regulation plan in place e.g. if a grower invests in a well they can use it.

A sixth of the total land under irrigation for agricultural production in the USA is in the state of California. Groundwater represents about 25-30% of the total, which rises in the drought.

Taking out more water than is put back into an aquifer (groundwater) creates what Americans call an "overdraft". This increases the depth to the water table and can create water quality problems. Users are forced to drill deeper water supply wells, which results in increased power costs. In addition, land subsidence is occurring, where the surface of the land sinks because soil becomes compacted and is no longer able to hold water. The current California overdraft is supposedly an average of two million acre feet of water, a year that is a net removal from the stored ground water.

According to statistics, 95 percent of new plantings of high-value crops are on micro/drip irrigation. These growers are investing in sub-surface, most of those people are generally high yielding systems.

Imperial Valley is high priority for water rights. They used to get nine feet of water per year – essentially what is needed for a whole year crop. But they now get a 5.5 feet of water per year allocation. Water costs are as much as \$1000 per acre foot in areas like San Diego for farmers who have horticultural crops, versus historic prices in Imperial Valley that have been \$20 per acre foot.

There are major environment concerns with nitrate leeching and groundwater contamination. Every grower must submit put a nitrogen management plan in place and implement it. The last drought has forced regions to look at water use and attempted each region to manage cuts of up to 25 percent.

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d) Harris Woolf Almonds

Harris Woolf California Almonds, is a grower, buyer and processor of California almonds. Established in 1989, they produce Inshell, Brownskin and Manufactured almonds, one of only a few California processors who blanch, roast, slice and dice. They are an approved organic processor under the Organic laws of USDA, and certified by California and California Certified Organic Farmers.

Harris Woolf produces about two percent of the almond crop in California.

The best time for maximum tree production is years five-seven, and a tree can last up to 25 years. Water use has gone up which has more salinity issues and that affects yield. Three acre feet of water is used per tree. The yield is about 2,200 pounds to the acre.

Dirt and sticks represents about 10 percent of arrival weight. Hole and shell has historically been sold to the dairy industry as it is a fibre for feed and the shells are used for bedding. However, with dairy struggling it's no longer lucrative. Prices have dropped from \$120/tonne for the hole and shell to \$40/tonne.

There are about 85 handlers in California, and Harris Woolf. The largest are Blue Diamond and Wonderful.

Substantial trees were planted in the last ten years in California. There is more consistency now. Current prices were an average of US \$4.50c/pound. It is currently about US \$2.20c/pound. Record defaults in the Middle East and India have affected the market, and specifically affected by those who were too aggressively optimistic.

Almonds require pollination in a tight timeframe. Although some new varieties are self-pollinating, the cost of bees is very high, as much as US \$175 per hive. Takes about 2.5 hives/acre to pollinate. Bees are in the field from early February to late-March before insecticides sprays are used and bees are removed. About eight frames per hive is the average. It's been hard to get enough hives to manage the almond season.

Two-thirds of all almonds are exported and a third is consumed domestically. Western Europe is the biggest market followed by Middle East, India and China. The biggest competitor is Australia, followed by Spain. The USA represents 91% of the total world production of almonds, but Australia is second.



Figure 3: Harris Wolf Almond Processing Plant

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e) Harris Farms Beef Feedlot

The group visited Harris Farms Beef feedlot, one of the largest fully integrated beef producers in the USA, managing cattle sourcing, feeding and processing. It was started as one of the first branded beef programs in the USA in about 40 years ago, their annual sales are more than US \$400 million.

They had 100,000 cattle in the feedlot during the visit, making it the third or fourth biggest feedlot in the country. They turn over about 270,000 head per annum. Harris Farms own all their own trucks.

They procure cattle from all around the Rocky Mountains and Nebraska. Trucking these cattle to Harris Farms is about 20 hours one way.

They have a super-sized truck wash with guns that are inserted specifically into small areas to eliminated e-coli, salmonella or other outbreaks. There may be a recall (small batch) about once a week across the whole industry. At Harris Farms, they haven't had an outbreak.

On average, they kill 1,100 killed per day and there is about 110,000 killed per day across the USA so they are 1 percent of the total. Their beef is higher quality, quite niche.

"We load 31 trucks per day of cattle for slaughter, which is about 50 miles away"

About 10 percent of their beef is exported, mostly to Japan and Hong Kong. Harris Farms were the first branded beef company in the USA, branding their beef and boxes, you pay a premium for a little better quality and the name.

Feed rations are kept simple. The biggest ingredient is corn. They have five trains of corn coming into the feedlot every month. A train is 110 cars, and 12,000 tonnes per train. High volume means good buying power.

They steam and flake the corn. They soak it for eight hours, and they go through rollers.

Second biggest feed commodity is a by-product of ethanol production. It's a syrup which helps bind and mix. The third largest ingredient is lucerne. They receive about eight loads per day.

They have the highest inputs of any feedlot in the country, but their weather means they can finish quality cattle. It is less hot than southern California and Nebraska. The weather is more consistent.



Figure 4: Feed rations at Harris Beef Feedlot

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f) Californian Crop Improvement Association (CCIA)

Incorporated in 1944, the CCIA are the official agency by CA law agency to provide resources and support research that promotes the improvement and production and quality of seed. It is a non-profit organisation. There is also the affiliation with UC Davis University.

They undertake field inspections, reporting from the field visits, and regulate the process through to bagging and export. They are active in controlling golden dodder, a noxious weed.

This season, they flew planes across the Imperial Valley and identified 100 fields had dodder identified – there are about 300-400 fields in total. They stated that this dodder is controlled and destroyed. Then it is separated at the cleaning sheds and generally, there is good growers and seed cleaner co-operation.

There are about 40 percent are positives. If tests for dodder are clear – 400g sample required from a 10-tonne load – they have met the regulatory requirements.

The CCIA doesn't test for GM as this doesn't affect certification. This is self-policing. For example, presence of Roundup Ready is tested prior to planting. The Farm Bureau records the presence of GM. PCR tests are done as China requires proof of non-GM hay.

There is an effort to control dodder prior to harvest. Growers spray and burn, or chop and bag it. If it's too late to burn, the grower will lift the header when they see outbreaks. Alternatively, they use Stomp at the equivalent of one gallon per acre.



Figure 5: Harvesting safflower in Central Valley, with cotton crops in the background

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Visits in Idaho

g) Forage Genetics International (FGI)

FGI is a major international seed company which has a comprehensive biotech program and breeding programs across the USA and in Argentina. The group met with FGI at their new processing facility in Nampa – which had been open for three weeks.

According to FGI, the HarvExtra (low lignin) variety will be released in the USA in 2017.

The group were shown around FGIs salt tolerant plots and 12 x 10 cages with controlled trial work being undertaken.

Significant yields are being achieved in year one of seed production e.g. 1200 lb per acre for a 6 dormancy.

FGI explained how pollination is the biggest input for lucerne seed growers. For example, the average cost is US \$120/gallon for leafcutters, with five gallons required per acre requirement. They do a tremendous amount of work, hence shortening the pollination window. They are at work from early June to mid-July.

Water is cheaper than California, at US \$75/acre. In Idaho, some pump from underground, and they don't pay for the water. A bore might be 10 foot to 250 foot and even deeper in some areas.

Non-dormants take less water than dormant lucerne plants. Winter active have smaller crowns. The process is defoliate, harvest, irrigate, thinning. Growers want to leave it bare before the snow falls. Discing will thin some of the crop. Some will precision slice to take the crown out, rather than the root.

FGI has a designated nursery for pest and disease resistance. Forage yield is critical, looking for parent plants whose progeny are high yields. All these are dormancy 3-4.

The group were shown lucerne plants staked like tomato plants as part of a trial. It is possible to strike lucerne plants and grow the cuttings. They can take 6-12 stems from a plant, dip them into a compound, and put into growth chamber for 3-4 weeks. They look horrible initially, then they start root growth. Once you clip them back the first time they start growing. They take DNA from a leaf to ensure the DNA. A lot of handling that goes on. So, there will be copies of each plant. They weigh the yields the top tier will be kept for further research.

“Single plants can potentially producer half a pound. 5-6000 pounds per acre”.

h) Dairy Farm Visit

About 30 percent of the alfalfa used at the dairy which the group visited in Idaho is own-grown. They also grow wheat and triticale. They purchase distillers' grains, cotton seed and almond meal for their dairy rations, most of which is purchased from California, Idaho or the Mid-West regional generally.

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The average cow is producing about 88lb per day with year-round production. All cows are housed throughout the year and there aren't many pasture-based dairies in Idaho, only a few organic businesses. They eat between 54-58 lb of dry matter per day.

The volume of alfalfa used does fluctuate depending on market conditions.

Almost all the milk from this facility is used for Mozzarella cheese, mainly for the domestic market.

There are 500,000 cows in Idaho. As a comparison, there are about one million cows in California. Where there are housed dairy systems, there are fixed costs so things don't tend to fluctuate much.

The volume of milk that is exported from the USA is 17% (2013-14 figures), compared with 50% in Australia, which might account for why there appears to be less fluctuations in price. The domestic dairy industry consumption is quite strong.

"In US law, GM alfalfa which is fed to dairy cows does not then equate to GM-milk".

i) Lucerne Paddocks

The group viewed several lucerne seed stands near Nampa in Idaho.

Using 24 inch rows and population 50-60,000 plants per acre, growers are planting fields in August, that can produce a one-year crop as they are able to achieve a top yield in year one. Then they plant wheat then go back to lucerne seed in year three. No grazing or hay production, just set back.

In Idaho, the lucerne seed crops are only for seed production. They are not fed to animals, and the primary reason is that they can get special local need emergency labels on pesticides. This enables them to grow the HarvExtra crop. They would expect 12-1600 lbs per acre of seed production from year one. The total irrigation in a first-year stand is between 18-20 inches.

"There is are areas in Arizona where growers are double cropping, growing doing both alfalfa seed and veggies in 12 months. Growing vegetables in autumn and winter, then planting alfalfa in January".

The group also visited Alforex Seeds's first low-lignin variety fields, which has been marketed as having 10 percent lower lignin levels with their Hi-Gest variety. But studies have now shown that it is closer to 15 percent. It also has greater protein value for the grower.

Alforex also promotes the Hi-Gest as a "non-transgenic technology", thereby making forage production fields not requiring special stewardship or management. (Transgenic's have had a foreign gene deliberately inserted into its genome).

According to our hosts, the price per gallon for leafcutter bees in Idaho started at US \$95 early in the season, and they increased to US \$150 per gallon. The stocking rate is about five gallons per acre, versus two gallons per acre in Imperial Valley.

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Figure 6: Lucerne seed paddocks in Nampa, Idaho

j) Visit to a Hops Farm

The group visited Obendorf Hops Farm with host Brock Obendorf, in Idaho and this visit provided some diversity to the learning. There are only a few hops producers in Idaho as it is a very specialised, labour intensive crop. The Obendorf business has about 1,000 acres.

Demand for hops isn't really driven by public consumption like horticulture or fruit crops, but by decisions by corporate brewmasters and microbreweries. With different types of beer, mean different varieties of hops. With production, hop growing is all about timing.

The lifecycle of a hop plant is 7-10 years and they grow to over 20 feet tall. Workers are in the field from May ensuring – by hand – that the budding stems are finding the twine needed for the plant to climb. The tops usually reach the top of a trellis in July. The trellises look like winegrape stands you see in famous wine regions like the Coonawarra, except they are almost 20 feet tall.

Spider mites, hop aphids or powdery mildew are the main pest challenges.

The hops go through a rigorous processing procedure and the product are “bales” of hops for the market.



Figure 7: Visiting the Obendorf hops farm

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Tour Learnings and Benefits

- Almonds are California's biggest export commodity by value.
- The dairy industry remains the largest commodity in California.
- Drought is significant in California with some areas getting eight percent of their normal snow pattern over the past five years.
- About 40 percent of the water in the Central Valley is utilised from ground water wells
- The Imperial Valley in Southern California is still GM free.
- Hay prices have dropped substantially, meaning there is more area for seed production.
- Cleanout rates in the USA are higher than in Australia.
- Noxious weeds such as golden dodder is a significant issue in some regions.
- Leafcutter bees are hugely beneficial, delivering pollination outcomes far greater than honeybees.

Recommendations for the Australian Lucerne Seed Industry

Whilst there is a moratorium on growing GM crops in South Australia, the lucerne seed industry must develop a more rigorous protocol / code of practice to manage the current GM-free status in Australia. Contamination would be catastrophic for the industry and may close markets.

A major competitive advantage that US growers have with lucerne seed production are leafcutter bees, which are highly effective for pollination. The Australian industry needs to focus on pollination, how to maximise the effectiveness of the Australian honeybee, and research any other ways to improve lucerne seed pollination for Australian growers.

The USA has an ability to promote and sell lucerne seed at a premium price to the major lucerne seed markets across the world. Australia needs to focus on value adding, branding and a whole-of-industry marketing plan to promote the clean, green, non-GM image to compete.

The investment in research and development of lucerne seed has been declining from the public sector, and moving to private investment. The Australian industry must collectively target the public sector of the benefits of Australian pasture seed, to gain better resources and support to enhance market share and value.

Nicola Raymond
Lucerne Australia