



A Nuffield Farming Scholarships Trust

Report

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The Three Counties Agricultural Society
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Remaining competitive within
the UK top fruit industry

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NUFFIELD
UK

Disclaimer

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Thanks

- ❖ To my wife Mandy and daughter Lauren
- ❖ To my parents and the workforce who kept the business running whilst I was away
- ❖ To my sponsors: The Worshipful Company of Fruiterers and The Three Counties Agricultural Society
- ❖ To Heineken (UK) Ltd who sponsored the Sustainable Agriculture course.
- ❖ To the growers I visited:

These are listed in the Appendix and I am indebted to the warm reception received from all the growers I visited. Though technically we are competitors it is almost as if we belong to a global family who galvanise to fight the majority of the industry problems that are beyond our control.

- ❖ To all the other processors and industry representatives who spared time to see me.
- ❖ To the IFTA for their welcome at the annual conference and tour.
- ❖ To the Nuffield organisation, particularly the volunteers who ran the CSC and those who helped me organise my trip, write my report and provided hospitality on the way.



Camaraderie built up on Nuffield travels (myself on right alongside Dr Terence Ropbinson of Cornell University)



1. Executive Summary

Top fruits now cover 45% of the 122ha family farm that I run in North West Herefordshire. My study seeks solutions to ensure they continue to complement the poultry and arable operations and have a robust future in my business and those of other UK fruit growers.

I visited New Zealand, China, Australia, Chile, Argentina, Brazil, Germany, Belgium and Holland.

Global perspectives in the top fruit industry

By 2020 world apple production is estimated to have increased by 400,000 Tonnes per annum, despite the challenges from climate change. This represents an annual 100,000 tonne deficit against forecast demand with increases seen mainly in Asian countries.

Other top fruit markets will remain static other than that for cherries which has a brighter outlook. Twelve month global supply is now virtually guaranteed, although trading will be less opportunistic and must become more organised.

Cost conundrums – global costs of growing fruit

A decade of chasing export markets has already led to a 20% erosion of margins globally. Labour supply and costs are universally problematic and mechanical solutions to harvesting, pruning and thinning are becoming essential. Further unique solutions are required to even offset cost increases in areas outside of growers' control, such as energy and water supply. Precision technology, rootstock/varietal development and new planting systems have become areas of huge focus globally. Attention is also shifting to greater costs further up the supply chain.

Vertical Integration - climbing the supply chain

In Chile 98% of top fruit is sold direct by the growers and all the New Zealand growers that I met had financial involvement and, in many cases, full control of the packing or processing and sales of their top grade fruit. Globally I observed that considerable consolidation and integration of farming business was occurring to ensure survival. Other businesses were increasing value in their products where they were unable to expand their growing area.

Marketing – local versus global?

Competition is intense amongst those countries chasing the "Asian prize", but in local developed markets, consumers have become disengaged from top fruit products and expect year round availability. Inconsistency in quality and the demise of powerhouse global marketing organisations has thrown worldwide coordinated sales of fruit into disarray.



Biological farming solutions

The Australians have developed a “fusion farming” approach with particular emphasis upon mineral, microbial and pest and disease management. This provides sustainable alternatives and re-establishes the link between crop nutrition and human health which is particularly relevant given a disturbing rise in type B malnutrition in the developed world.

Research in New Zealand is revealing the importance of soil carbon for biological farming in orchards and sequestration of it into the soil could give global agriculture a unique opportunity to redress future climate issues.

Conclusions & recommendations

1. Hard decisions will need to be taken in regard to retaining existing orchards and whether to continue in the top fruit industry. New planting systems and varieties will have to be adopted for apples and diversification into other crops such as cherries will be essential.
2. Top fruit growers are unlikely to survive if they have not already integrated their business or chosen a specialist production area such as cider apples. I recommend that all growers review their businesses to look at consolidation and more direct market control options.
3. All growers must re-engage consumers and redefine high quality top fruit. A new emphasis should be placed upon what we can do for our customers and I recommend that all growers plan to grow their fruit for a very specific market.
4. There is huge scope to explore biological farming methods in orchards and all growers should at the very least consider some simple trials.
5. Growers can only hope to mitigate future cost increases by continuing to update and innovate within their top fruit management practices.



2. Personal introduction

I am fortunate that over the years my wife Mandy has supported me throughout many challenges and endeavours in my work. The latest of these has been my “Nuffield experience”. In many ways this has required the greatest commitment of all from her, for which I am hugely grateful and massively indebted.

An upbringing on a North Herefordshire family farm stimulated my interest in studying for an agricultural science degree at Newcastle University. This provided the springboard for a rewarding career in the food industry and I worked for companies such as Rank Hovis, United Biscuits, Whitbread and Glanbia Foods.

Having become disenchanted by the politics of senior management, I sold my house and car, bought a helicopter and proposed to Mandy (in that order). After becoming a commercial pilot and instructor, I only too soon discovered that this lifestyle did not suit family life. Shortly after my daughter Lauren was born we relocated to Herefordshire to start a new life running the family farm.

Our business is based around a 122Ha farm with the following main enterprises:-

Poultry: 150,000 broiler unit with birds currently grown for Vion

Apples: 30 Ha cider apples grown under contract to Heineken
22 Ha dessert apples grown mainly for Copella (Pepsico)
3.5 Ha pears

Wheat: 40Ha grown to feed the poultry

Environmental schemes: ELS & HLS

Fruit storage: 1800 bin capacity controlled atmosphere stores

For those not involved in our industry, top fruits are fruits which are grown on trees. The main crop in the UK is apples, followed by pears, cherries and plums.

Why I chose to apply for a Nuffield study

A picture paints a thousand words and the one on the next page encapsulates the day to day perspective that I got whilst stoically working on my farm: Tunnel Vision!!!

For me the time scale for an application for a Nuffield Farming Scholarship was reaching its expiry date, and I needed a stimulus to break out into the wider world and set new targets for my business to achieve by the time I reach 50.



The day to day perspective of a top fruit grower

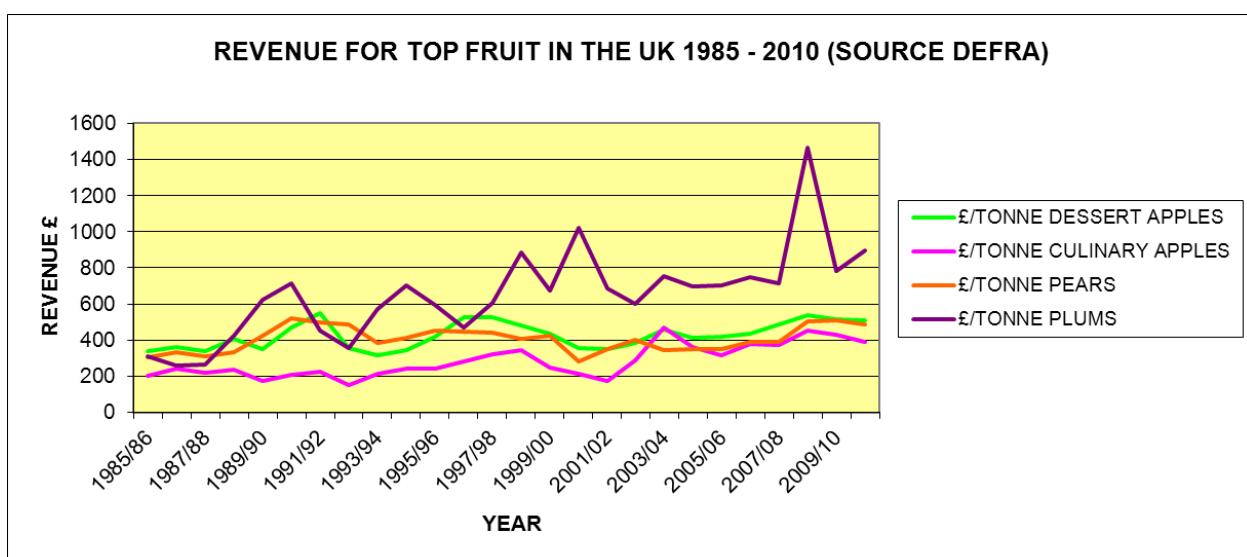
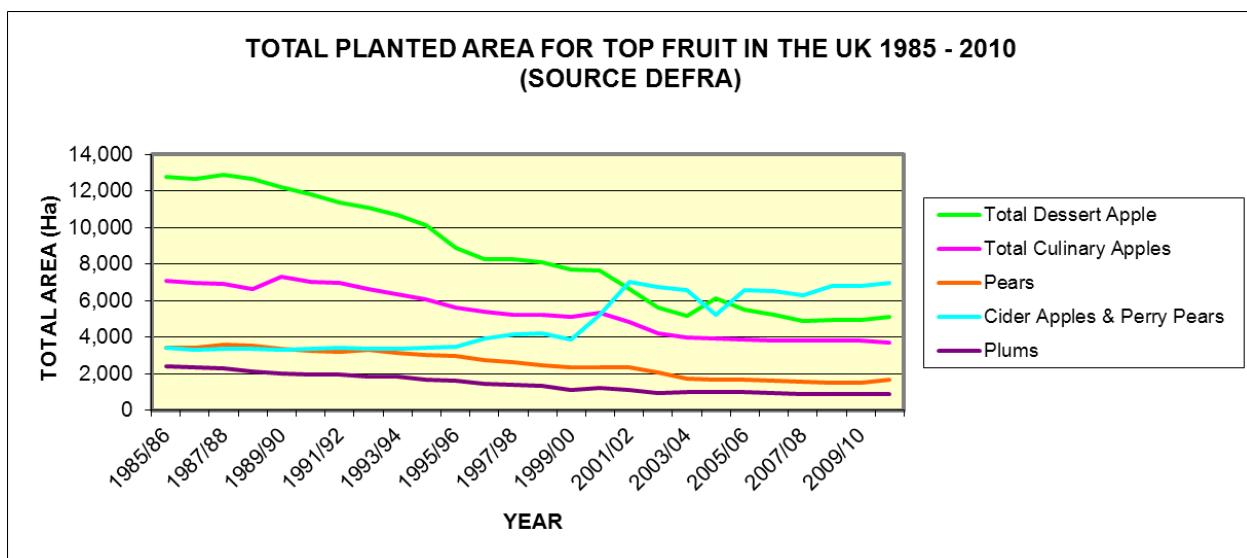


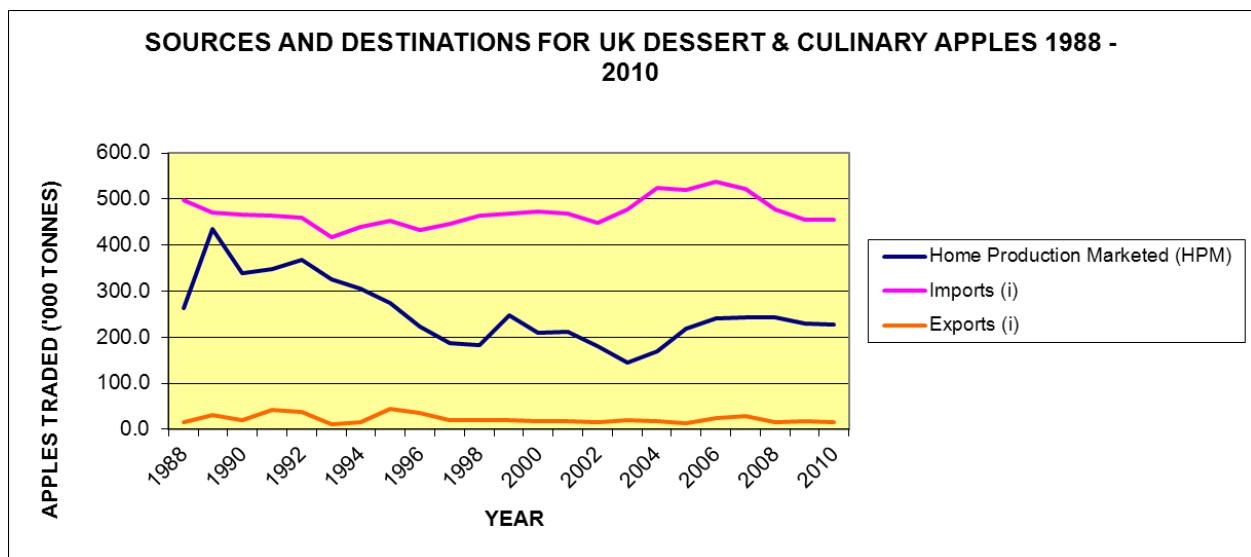
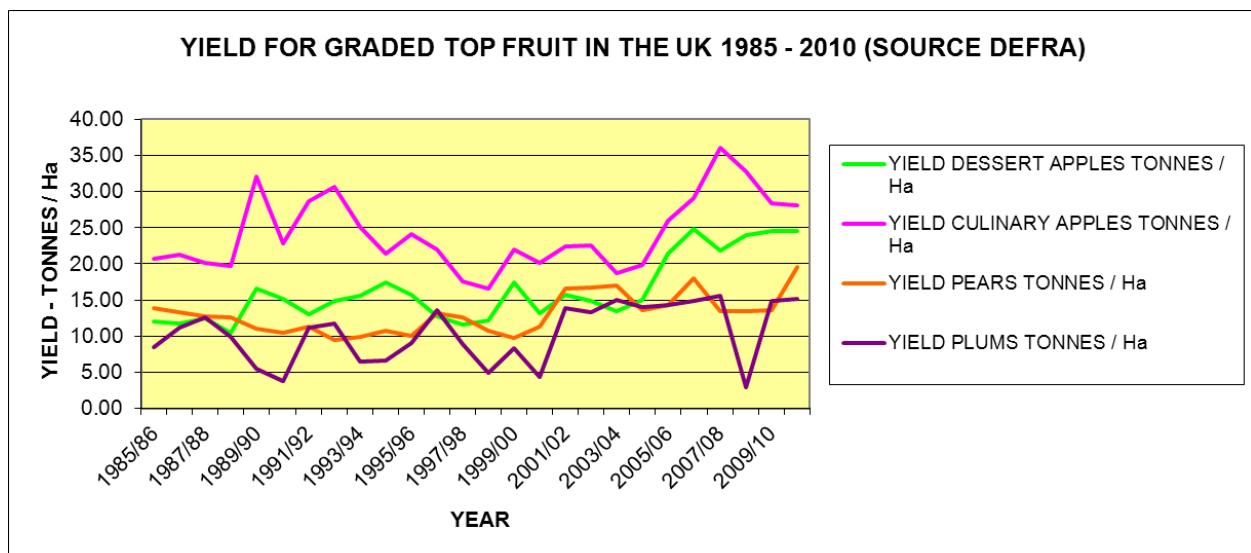
3. The UK top fruit industry

To gain a little perspective and a benchmark against my global findings, I have included this brief summary of how the UK top fruit industry has developed over the last three decades and where it might be heading.

The majority of top fruit has traditionally been grown in Kent and the South West (Worcestershire, Herefordshire, Gloucestershire & Somerset), with other pockets in Suffolk and Cambridgeshire.

See the DEFRA graphs reproduced below.





The key points derived from the DEFRA data indicate that planted areas of top fruit have declined over the past three decades in all sectors except cider fruit production. There are no apparent large increases in graded yields although this may be masked by the tighter grading standards that have evolved with the rise of the major retailers, leaving an unreported surplus to supply wholesale and processing markets.

Revenues appear to have risen slightly but clearly not in line with inflation. Perhaps one contributory factor to that is that total supplies of top fruit have remained fairly static while the UK population has increased.

The future of UK top fruit production looks set to continue to be influenced by the major retailers with polarisation seeing the emergence of a similar number of major dessert apple growers. Sarah Calcutt NSch predicts that the planting of intensive orchards will see increased production of dessert varieties over the next few years and recently predicted an



estimated 34% shortage of apple storage facilities, in the UK, by 2016. The Cooperative Group have also embarked upon an extensive apple planting programme.

Having originally only grown cider apples, it is hugely encouraging to see that over the past twelve months there has been a 12% increase in sales value of cider in the UK and a corresponding 10% increase in volume. Stella Artois introduced Belgian brewed Cidre last year, with some bittersweet being sourced from the UK. Carlsberg have just announced their entry into the cider market in partnership with Bevisol in Herefordshire. I could find no official figures for 2011 volumes of UK apples used in cider production but it is likely to be an estimated quarter of a million tonnes. This would represent between 55-60% of the UK annual apple production.

over the past twelve months there has been a 12% increase in the sales value of cider in the UK

Recent planting of over 500Ha by Bulmers growers and additional programmes for Westons Cider and Thatchers will only serve to bolster these figures when these orchards come into production.

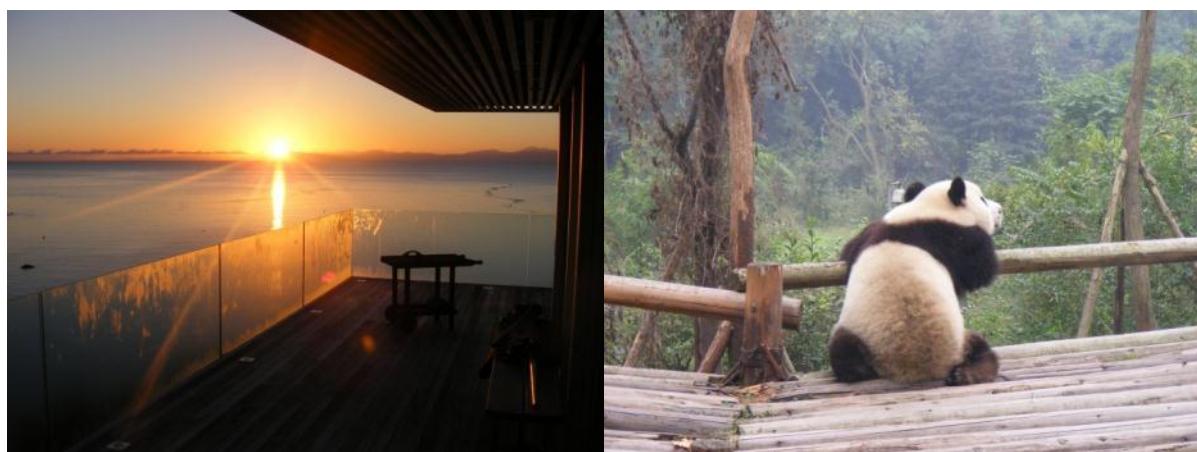


4. Study tour outline

The best advice for choosing where to travel came from a Belgium nurseryman who stated that I should aim to visit places that have undergone extreme recent difficulties as those are the very places that have had to innovate merely to survive.

New Zealand was an obvious destination as a post Contemporary Scholars conference (CSC) carryover. My time was shared between the Nelson and Hawkes Bay fruit growing areas, with quick trips to the Canterbury plains and Palmerston North sandwiched in between. I found a top fruit industry that had consolidated massively over the previous decade following the deregulation of ENZA and without exception all the fruit growers I visited had integrated up the supply chain. The scariest moment for me was a rare encounter with a Pygmy Whale whilst swimming in St Stephen's Bay!

We were in New Zealand shortly after the main Christchurch earthquake disaster and I cannot over-emphasise the huge amount of respect I have for the dignity with which the nation behaved in the wake of such a monumentally catastrophic event.



St. Stephen's Bay, Nelson, New Zealand

The National Panda Reserve, Chengdu, China

My intention when visiting **China** in November 2011 was to challenge personal perceptions of global agriculture, food consumption and how to manage travel in a country that uses a totally different alphabet. Chengdu in the Western Province of Sichuan was my base for visits to kiwi orchards, government agricultural bodies, research establishments and the Chinese Agricultural Trade Fair (CATF), a hugely enlightening showcase for agriculture from all China's provinces.

I was alarmed by the scale of a city of 15 million people that I had never even heard of and I was equally shocked by the great contrast between infrastructure investment and widespread poverty.

Travelling on to **Australia**, the Queensland sunshine was a welcome break from the smog of China. I attended the Brisbane Food and Drink Fair, where cider was the “new sensation”, and the superb NTS short course in sustainable agriculture. My biological farming quest also took me to New South Wales and southern Australia and enabled me to also visit vineyards,



Kaola bear in Adelaide orchard



Photo on right : Volcanoes influence the Chilean landscape

machinery manufacturers, processing plants, precision agricultural experts and an eminent soil scientist. There was also the mandatory Nuffield pilgrimage to Kym Green's biodynamic apple and cherry orchards in the Adelaide hills.

In January 2012 my trip to South America coincided with the IFTA (International Fruit Tree Association) conference in Santiago **Chile**, where I figured I would also meet a lot of North American growers. With infinite choices of latitude (allowing an enviable four month cherry harvest period) and altitude, one of the six worldwide Mediterranean climates and perfect phytosanitary conditions, it is not surprising that I was amazed at the levels of investment and development in Chile.

The International Fruit Tree Association post conference tour travelled south as far as Los Angeles (Chile) and I experienced an incredible traverse across the Andes to visit Neuquen in Patagonian **Argentina**. This region is the centre of one of the world's largest pear growing areas and is based around an irrigation system installed by the British in 1916. Fruit production is extremely challenging with very large trees and a shortage of workers due to competition from newly discovered oil fields, which has also led to very high labour taxes.

My South American adventure was rounded off in **Brazil** where I was surprised to find some extremely large apple growers, battling the odds of a wet and warm climate in the very southern "Campos De Cima Da Serra" region, centred on Vacaria. In a country that is booming economically, the Brazilian growers demonstrated a huge amount of resilience,



investment and confidence in their home market, which they predominantly supply. They also know how to throw wild parties!



The Argentinians have been welcoming British fruit growers since the early 20th century



Brazil - one of the four worldwide major booming economies

There is still much to be learned from mainland Europe but I prioritised visits to Germany, Belgium and Holland.

This report does not set out to document everything that I learnt about growing top fruit as my remit was wider than this. I am sure that in future I will be able to pass on my experiences to others.

All the photographs from my travels, including loads taken in orchards, can be accessed via my online internet album:

<https://picasaweb.google.com/106092319072583059897>

After reading my report you may be interested in a more anecdotal account of my travels. If so, why not log into my blog: <http://nuffall.blogspot.co.uk/> (left click to open the hyperlinks)

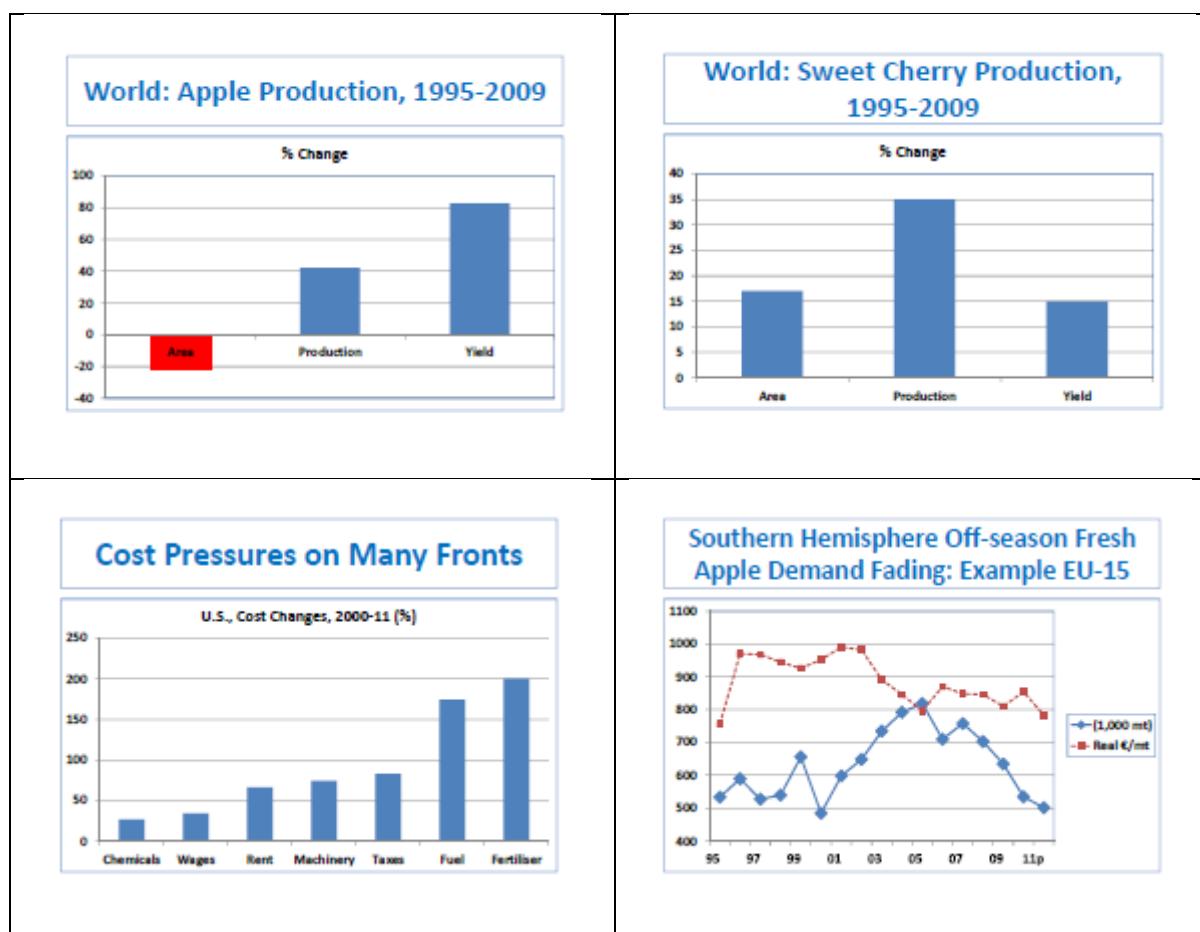
Or, for more specific details on dates, look up my travel diary in the Appendix to this report.



5. Global perspectives on the top fruit industry

The first session at the International Fruit Tree Association conference in Santiago Chile convinced me that not only is the global top fruit market driven by demand but it is further complicated by government legislation, perishability, long term production establishment and uncertainties of future requirements. Only recently, **Dr Desmond O'Rourke** (President of Belrose Inc.), signed off an email to me by stating “these are very turbulent times in the world fruit industry”.

I was clarifying some points that he had made in Chile. His view is that with a decline over the past fifteen years in *per capita* fresh top fruit consumption in major developed markets, the main top fruit growing nations have become increasingly reliant upon exports. Unfortunately prices have only risen by 22% against global inflation of 42%.



These comments were borne out by what I found in Brazil. Top fruits are not usually associated with the 41 million tonnes of fruit produced annually in Brazil. However **Pierre Nicolas Peres** from the Associacao Brasileira de Produtores de Maca, painted a very positive picture of their industry. A unique demographic episode in Brazil's history will see a huge peak in the economically active population over the next three decades. They are already experiencing a large rise in the sales of apples. Over the past four years production has increased by 26% to 1.25 million tonnes, exports have dropped 57% and imports increased



by 40%. Perhaps this is a story that gives real hope for exporting to emerging markets - or should we heed the Brazilians' concern for climate change and trends that may indicate a switchover to more fashionable soft fruits? Their economy has been a fillip to the fruit industry in Argentina, which had lost its way through reliance upon the traditional pear market and historical trade links with Europe.



Shio packhouse, Vacaria, Brazil

Agriculture is a priority sector for China and I was told by several people I visited that there was a government push away from subsistence grain farming. The only real tangible evidence I found for the expansion of top fruit production in China was after meeting **Joyce Cui**, vice general manager of Haisheng Agriculture Co. Ltd, who have set up an office in New York State to attract partners in a venture to establish a 5000Ha orchard in the Shaanxi Province of China. To put this in context, China has only 7% of the world's cultivatable soils but over 20% of the world's population. This was borne out by local officials quoting land prices of £50000/Ha and the "land grab" policy. On the ground **Di Yigang**, director of Eden Agriculture (Kiwi) Co Ltd told me that they were only interested in the premium markets in Beijing and Shanghai and export opportunities.

I became bewildered by the inconsistencies in fruit quality, wages, infrastructure and intensity of production that I observed in China. The more officials that I met, the less coherent the picture became. Clearly there is a growing population and disposable income but government policy will surely dictate what this can be spent on and who supplies it. The



overall impression I was left with was that Chinese fruit production still has some way to develop.

I was taken to a showcase kiwi orchard where an important launch was taking place for a new deal with a major retailer. Behind all the pomp and ceremony, the orchard itself was 0.25Ha, organic, entirely tended by hand and less than impressive. We must however be mindful of how much the Chinese nation has developed over the past twenty years.



Eden product launch in kiwi orchard, Duijiangyan, Sichuan, China

As only 10-12% of the world's human population lives in the southern hemisphere, it is little wonder that most of the countries I visited there had a pretty good handle on the global fruit market. The main exception was Australia which until 2011 had a mainly insular outlook, chiefly the result of its protectionist market.

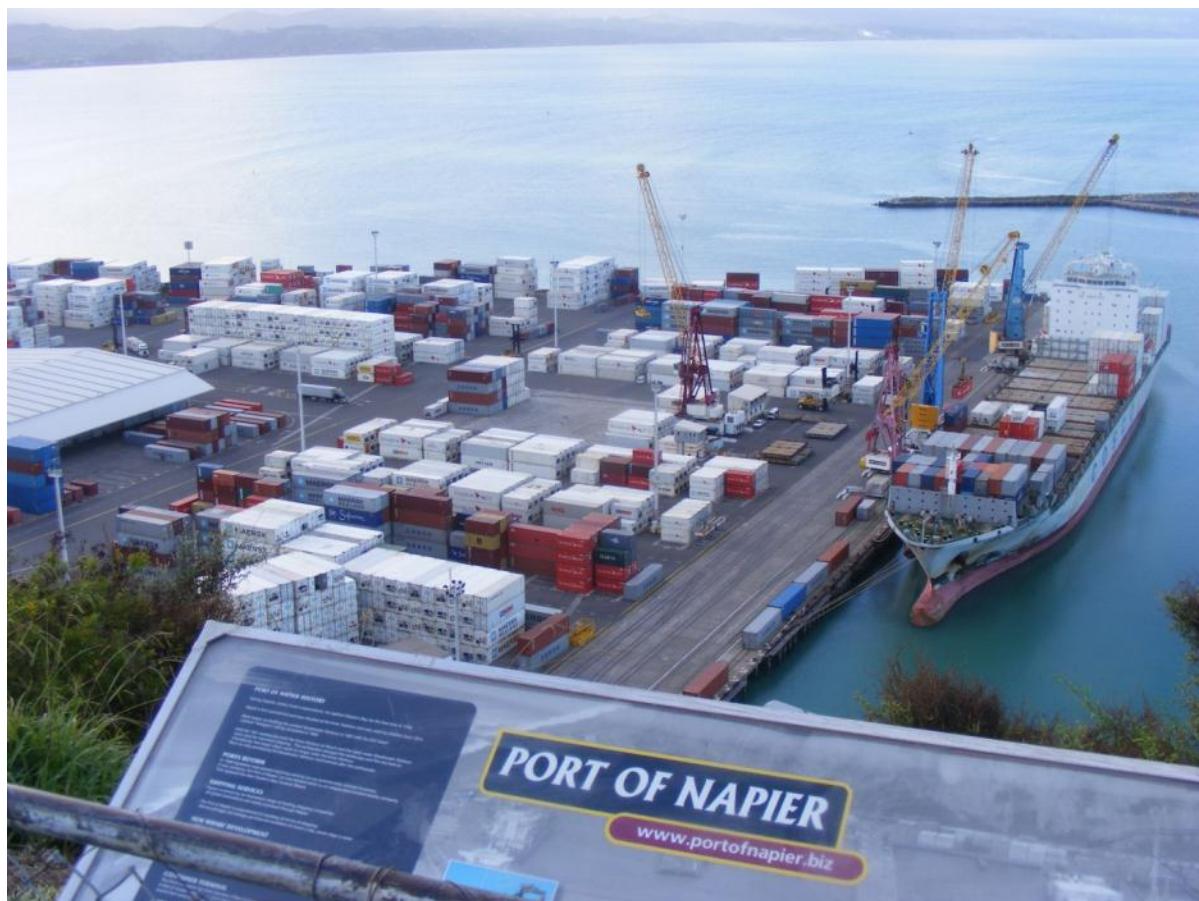
New Zealand has maintained many of its historical trading links with Europe, particularly in the Nelson region which produces approximately a third of the country's apples. It has a Mediterranean climate which is suited to growing more traditional varieties such as Braeburn, Cox and Gala whereas the Hawkes Bay area was less susceptible to the russetting of sweeter apples and has seen more planting of the "Pacific series", more suited to an Asian market.

One major frustration found by **Heartland Group NZ** lies, not unsurprisingly, with the major European retailers. A lack of continuity, chiefly caused by staff turnover, makes planting



investment decisions virtually impossible as there is no certainty of what demand there will be from Europe be in five years' time.

Peter Beaven at **Pipfruit New Zealand** told me that developing the future market had become far more fragmented since the deregulation of New Zealand apples and pears as a statutory marketing organisation. Pipfruit NZ was formed as a reaction to this, and is funded using a grower levy. The company is looking to promote New Zealand apples to emerging markets such as India which currently has a population of 1.22 billion and is estimated to become more heavily populated than China by 2030. Peter's colleague, Gary Jones, explained to me that a grainy Red Delicious was currently regarded as a luxury and found only in places such as upmarket hotels. He also told me how they were working with contacts in India to increase the 6 tonne per hectare average yield and 1.2 million tonnes grown in that country. Together they will expand the Indian market, allowing New Zealand to import their own fruit to supplement the Indian fruit out of season.



Napier port, New Zealand

Whilst in Chile I visited orchards both at sea level and at elevations of up to 3000 metres all in the same day. Travel is straightforward as there is only one major road, the Pan American highway. Heading south from the Metropolitana region at 32° south (latitude) your only choice is to turn left for the mountains or right to the coast. I passed through only three of the fifteen regions and reached 39° south! This served as a reminder that I was visiting a country that was longer from north to south than the whole of North America.



This huge diversity of choice of altitude and latitude which allows a vast range of crops and varieties to grow has been the mainstay of Chile's rise from supplying 4% of fruit exported from the southern hemisphere in 1961 to 59.3% in 2007. As a nation they are the 17th largest exporter of food and aim to be in the top ten within ten years. Fruit constitutes 31% of the nation's \$11 billion food export market. Interestingly, although top fruit only contributes 4% to GDP it supports 150,000 jobs directly and up to 1 million indirectly, in a nation of approximately 16 million.

	1961	1964	1970	1980	1990	1998	2001	2003	2007
CHILE	18.452	35.225	45.427	266.832	1.016.787	1.616.953	1.781.413	2.070.468	3.866.859
TOTAL S. HEM	468.915	601.566	704.459	1.062.586	2.263.724	3.465.542	3.569.109	4.222.968	6.517.560
% CHILE	3.9%	5.9%	6.4%	25.1%	44.9%	46.7%	49.0%	49.9%	59.3%

SOURCE: FAO STATS 2007 – FIGURES IN TONS

Chart to show Chile's fruit exports vis a vis the rest of the southern hemisphere. Figures shown are tonnes

Antonio Walker, the president of Fedefruta, told us that apples now covered 37,000Ha and cherries 13,500Ha with plantings of 1000Ha/year. Much of the fruit is currently exported to the USA & Europe; however the Chileans see Asia as a huge target market. Their biggest advantage is that they can supply fresh fruit to markets over a very wide season although the climate and low disease burden also help. This year the Chinese New Year fell early, but whatever date it falls on, Chile can cope with the massive sudden demand for cherries over this Chinese holiday period.

One of the key issues that **Desmond O'Rourke** (president of Belrose Inc. *sic*) highlighted was the threat to global markets of increased government regulation, such as the USA food safety modernisation act of 2011 and European Union threats on minimum pesticide residue levels. New Zealand has coped well with legislation and has gone beyond the global gap initiative with the introduction of "Fruit Futures", a zero pesticide programme. I stayed with Nuffield Scholar Julian Raine who was instrumental in its inception but was typically understated about his input.

Chile has also stepped up to the mark and Antonio Walker described to us how **Fedefruta** had worked with the Chilean government to set up five USDA-SAG pest detection facilities, through which all fruit exported to the USA passes. These are jointly run by the government Agriculture & Livestock body (SAG), USDA and the Association of Chilean Exporters (ASOEX). Whilst waiting in the reception of the Teno inspection site I saw a large photograph of the Chilean president opening the facility in 2009 and appreciated the importance attached to this scheme.

See photo on next page of inspection site at Teno, Chile,

One of the consistent messages that I heard on my travels was about the decline in the *per capita* consumption of fresh top fruit in the major developed markets. Globalisation and advances in storage and logistics have led to increased popularity of berries, exotic fruits and snack products. The general consensus among growers was that the "club variety"



concept was flawed and that the organic market has no further to grow without reducing its premium.

Desmond O'Rourke (Belrose) has forecast that, by 2020, the global supply for apples will have grown by 400 thousand tonnes. There is an immediate demand for 200 thousand tonnes from South East Asia and China could absorb 100 thousand tonnes, so we must wait and see if countries such as Japan and South Korea will generate enough demand to meet this shortfall.

He also predicts that the global cherry market will have to cope with far more volatility with more overlap from a global twelve-month-of-the-year supply. The whole market will evolve to become less opportunistic and, with the need for more structure, he advocates the formation of an international sweet cherry organisation.



Inspection site, Teno, Chile.

Despite Holland's might as a fruit and vegetable exporting nation, I was told that the Dutch apple industry is in turmoil. Partly this is due to severe frosts killing trees in the north of the country but mainly due to the German market demanding a lower "Aldi/Lidl" quality apple and the Russian market aligning itself more with other emerging Eastern European countries such as the Czech Republic and Serbia. Diversification into pears and fruit for cider production (Stella Artois) has left a more stable Belgian market whilst I found the Germans happy with their domestic market.



6. Cost conundrums – global costs of growing fruit

Although most growers did not express it directly, my observations are that globally they are having to deal with suppressing cost increases and would consider at their peril the more traditional approach of seeking areas in which to *save* costs. Their primary aim is to boost performance, cut down on waste and increase quality, a view very much endorsed by **Antonio Walker**, president of Fedefruta Chile.

6a. Labour – cost and availability

Orchards are traditionally very labour intensive. The work force is mostly required for pruning, thinning apples and harvesting. Wages simply reflect the availability and willingness of people to undertake manual outdoor work. Global trends towards urbanisation and a reduction in fitness of the population in the developed world have severely affected labour supply to the fruit growing industry. The price of labour was the primary cost concern of all the growers in all the countries I visited.

In direct contrast to all my other observations in relation to labour, I bumped into a chap called **Sean Phillips** on the Seresin wine estate in Blenheim, New Zealand. He introduced me to his gang of “woofers”. Initially I thought that he was being rude, as they were all female, but he went on to explain about the World Wide Opportunities on Organic Farms or WOOFER Organic Farming service, akin to the Kibbutz scheme.

My initial thoughts were “cheap labour, that fits well with my study topic” though the longer I spent with them the more I realised at how well informed, enthusiastic and engaged they were with the estate’s work and the land. Surely this is what we all strive to instil into our staff but Woofers clearly demonstrates that workers’ needs extend beyond merely paying them to do a job. *See a photo of these woofers on the next page.*

Average wage levels quoted to me by top fruit growers (converted to GBP in May 2012):

Country	Orchard labour costs (£/Hr)
UK	6.41
Australia	12.02
Argentina	4.87
Belgium	7.28
Brazil	4.06
Chile	3.25
China	??
Holland	7.30
New Zealand	7.34



Woofers at Seresin Estate, Marlborough, New Zealand

I consistently asked all my hosts in China how much their labourers were paid and never got a straight answer. It is also very difficult to find any official figures although it appears that a rural migrant will earn around £0.85/hour in a factory. Labour shortages and “westernisation” will surely inflate costs and as subsistence farming reduces with an ageing agricultural population, the cost of wages is sure to become more relevant.

See photo on next page.

Both Chile and Brazil have booming economies and there is much competition for labour from others industries, particularly mining. A similar scenario exists in the Neuquen area of Argentina where recent discoveries of oil fields have heralded greater competition for workers. Australia has also seen a mining boom. Jaime Gonzalez of **Unifrutti in Chile** told the IFTA conference how labour costs had risen by 75% in three years to \$40/day and some forecasts predict that this rise will continue at an additional \$10/day for the next three years.

Oscar Aliuga from **Pomanova** reinforced that labour represented 60% of the cost of growing apples in Chile.

Argentinean growers rely upon seasonal migration from the north of the country but have to pay a very heavy tax levy on labour.



Labour at the Eden Kiwi Processing plant, Dujiangyan, Sichuan, China.

New Zealand depends heavily upon Pacific islanders on the Recognised Seasonal Employers (RSE) scheme. It will be interesting to see how the European labour market develops, given the problems with the euro and the reaction from accession states in Eastern Europe. Despite having a harmonised European Union, several Dutch growers were bemoaning the fact that they had to pay far more than the Germans did five miles across the border.

Despite these trends an interesting perspective came from Antonio Walker when he hosted us at his **La Matriz Orchards**. When asked about the costs of the labour intensive process of tying down branches he replied stating “I don’t regard it as a cost but rather an investment”.

6b. Mechanisation

Perhaps it’s not surprising that the Europeans are leading the way in the field of mechanisation although I was told about some interesting work in the USA.

The major cost in top fruit production is harvesting. **Lynne Long** told the IFTA conference that cherry harvesting cost \$0.3/lb (approximately 63% of total costs) The next two biggest costs are pruning at \$0.0335/lb and pesticides at \$0.084/lb. Developing this theme, productivity of 78Kg/hr/picker is found in so-called pedestrian orchards where ladders aren’t required, compared to 45kg hr/picker in cherry orchards with larger trees.



Francisco Pratt at **Buenos Aires De Angol** showed me figures demonstrating that a Munchoff picking platform reduced harvest costs by 25% although it was stated that one of these rigs must be used for 90 days annually to yield an acceptable payback.

In Argentina virtually all the trees I saw were taller than my cider trees where we mechanically shake and harvest apples off the floor. The harvest time takes on a circus theme with pickers balancing off 14 step ladders and little wonder that they only manage to pick four bins each per day (approximately 1.2 tonnes).

In Brazil, **Marcos Dal Piaz** demonstrated some interesting harvesting solutions where trailers were driven into and hoisted upwards within a frame in the orchard.



Harvesting pears in Argentina.



Frutival harvesting trailer, Brazil.

Much of the talk among growers was about the vacuum harvester developed by Phil Brown Welding in Michigan. Apples are picked and placed in a suction tube which delivers them to a slowly rotating “elephant ear”-shaped open canvas pouch which provides a soft landing and gently dispenses the apples into the bin beneath it. Growers that I spoke to who had seen the machine said that it was progressing very well but they were still having issues slowing the fruit down without bruising it.

See : <http://www.youtube.com/watch?v=-fABg7qx2dU>

Some of the most exciting technology that I saw was invented by Raury Flemmer at **Massey University** in New Zealand.

Using a \$100 camera he has developed an “intellipick” robotic kiwi harvester. With four arms he estimates it is capable of picking 10,000 fruit per hour, including downtime for bin changeover. I was privileged to be shown some prototypes and a top secret DVD of the latest model working. It was extremely impressive but a financial partner needs to be found to commercialise it. We discussed how this could be converted for other fruit and evidently it would be no real problem to do so.

Having practised mechanical pruning for the past five years I was surprised not to have encountered it anywhere else on my travels. The use of mechanical thinning machines such as the Darwin were mentioned. However, in order to achieve an even crop and utilise labour



most efficiently, many countries were starting to thin the fruit bud rather than small apples. Diego, the manager at **Santa Olga Orchard**, estimated a commitment of 135 man hours per hectare for hand thinning.

I also encountered some surprisingly inefficient bin logistics in various orchards although the New Zealanders and Chileans had some trailers that would transport five bins at a time.

6c. Precision

Precision orchard techniques represent a whole study area in their own right, as Doug Hutton Squire ably demonstrated in his excellent Nuffield report. I therefore chose not to look too deeply into this subject area but have included a mention of it in this section. It is often considered to be an extra cost burden but as technology advances it is worth doing a cost benefit analysis to judge when it is right to invest.

This was amply demonstrated at the 6000 Ha estate of **Puablo Kleppe** which is a two hour drive east of Neuquen and runs alongside the Rio Negra (an excellent stopover for a lunchtime swim and barbecue). I would easily get lost in their network of tracks and orchards and two years ago they added GPS trackers to all their tractors. Most of the spraying is done at night and they found some alarming results. One example was of a tractor stopping 20 times in half an hour. On checking the operator's SMS records they discovered a corresponding number of texts being sent around the same time. Rows were being missed or duplicated but such behaviour is now taken care of by the introduction of a robust record of spraying operations which is audited by their quality team. This has now been extended as an integral part of the "chief rapid information system" which handles all the logistics around the orchards with bar coding of bins and transportation to the store.

Brett Whelan (senior research fellow at the Australian Centre for Precision Agriculture, University of Sydney) advocated a mass balance precision approach to orchards with improvement to graded yield being the primary objective. They have already developed an automated tree inventory system in citrus orchards which essentially boils down to treating every tree individually, rather like dairy cows. The use of remote sensing equipment is vital in this area. The aim is to even up input costs across the whole orchard and improve returns.

Dr Paul Dare of Spatial Solutions in Adelaide claimed that by using the SpecTerra DMSI multispectral sensor, mounted on aircraft at 7000 feet, enough definition can be gained to provide cell density (pcd) data which gives an indication of plant health & vigour, thus enabling growers to target their resource costs and maximise yields. He is also developing thermal imaging with software to interpret heat stress in plants with a view to optimising water utilisation.

Water is scarce in Australia and **Peter Korczynski**, a passion fruit farmer from the Glass Mountains region of Queensland, was conducting some interesting remote sensing soil water capacitance trials, the results of which indicated that the cheaper Gophers were more than capable of performing as well as the Enviroscan. **Colin Ross at the Seresin Estate** in Marlborough, New Zealand, has however saved water and fees by cancelling the contracted service using probes, and buying a shovel.



6d. Energy Costs

As fruit growers we have very little control over energy costs and the most efficient growers I visited placed value on conservation of resources through wise management decisions. Energy costs beyond the farm gate are a far greater concern for the major fruit exporting nations although I did learn that the Chileans have amongst the highest energy costs in the world.

The 850Ha **Yealands** wine estate in Marlborough, New Zealand, placed “zero carbon” as the starting point of their sustainability objectives. Full measurements of their carbon footprint (1320T/year) challenge them to become creative and innovative, claims **Peter Mann**, their sustainability manager. Virtually all the initiatives save money: whether it’s baling and burning 60T of prunings to save 20T of LPG; turning 80T of prunings into compost; a unique heat recovery system in their winery; or using plastic instead of glass for their bottles. Their cost model involves bulk transporting wines globally and bottling at point of consumption. One of the most intriguing initiatives is the use of baby doll sheep to graze the orchards. **Peter Yealands** initially bought hundreds of guinea pigs but unfortunately the local falcons soon dined out on these.



Baled prunings for burning in biomass boiler at Yealands Winery, Marlborough, New Zealand.

Convinced he could save money on each of his ten annual 3000 km vineyard mowing rounds, he told me he set out to find a breed of sheep “with thick necks & heavy heads, so the buggers won’t want to look up and eat the vines”. He settled on the baby doll breed and



having purchased 20 sheep from Australia at \$3000 each, he plans to cross them with a Suffolk to eventually run 10,000 sheep across his estate and upland holding. This seemed a little far fetched to me until Peter Yealand mentioned that he stood to save NZ\$1.3 million per year and raise income from wool and speciality small lamb cuts.

More work has been done with Shropshire sheep, particularly in Denmark, Germany and France. According to Benoit Gill from Nancy in France, this shows promising results with cost savings from less mowing and biological benefits from the sheep muck and orchard sanitisation.

Perhaps the most amusing energy saving initiative was the development in 2010 of a horse drawn sprayer by the **Seresin** estate in New Zealand, although later in my travels I was more impressed to see a 1901 version which had been built in England and was on display in Neuquen, Argentina. In Belgium I saw a workable “spray/mow” combination in practice and the Dutch have pioneered multi row spraying, all contributing to reducing the number of passes through the orchards.

6e. Varieties and planting

To date I have discussed the major variable costs of top fruit production. Just as critical are the capital costs of planting new orchards. I was alarmed to hear how high the price of good quality land was in all the countries I visited. Most of the figures I was given would factor down back to around £10000/acre. This is a vital cost, often overlooked by land owners when calculating their growing costs. New apple orchard establishment costs were also fairly consistent across all countries with a figure of £25,000/Ha around average. It is well established that high density orchards will get into cropping sooner and give a better rate of return.

There are many variations on planting systems but the most thorough trial I came across was in Belgium where **Jef Vercammen of PC Fruit** has conducted a ten year planting trial for pears. Distilling his results, it appears that the “long pole” followed by the “Drapeau” planting systems showed the best results.

The layout of new orchards can derive great benefits of cost reduction. This was particularly clear in the 2D canopy design championed by **Craig Hornblow** in the Nelson area of New Zealand. He claims big savings at harvest time (up to 30%) and some growers only needing to spray every other row. Other systems such as the fruiting wall lend themselves to mechanical pruning, thinning and ease of harvest.

Often the requirements of the grower are overlooked and superseded by the requirement of fruit in the chill chain and consumer preference. This makes the development of new rootstocks a vital and exciting prospect for top fruit growers in the future as you can, in theory, select a root stock to suit the grower and graft onto it a variety to suit the market.

In Chile I met **Terrence Robinson of Cornell University**. His team has developed the Geneva series of rootstocks, an exciting new range which may confer resistance to scab, phytophthora and replant diseases. All these traits will help save costs and boost future performance.

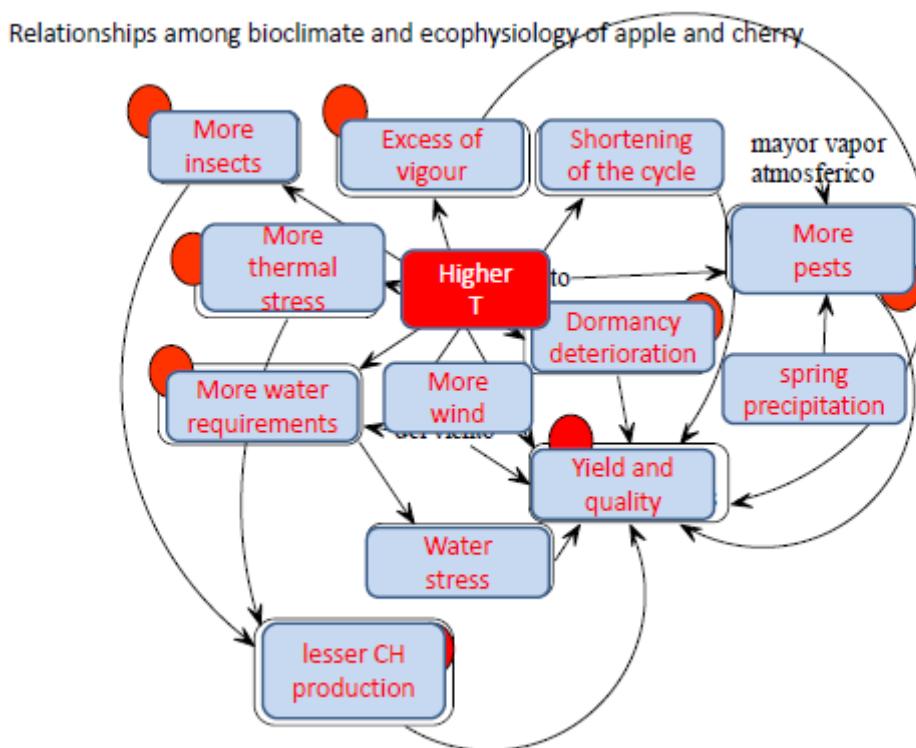


6f. Climate change

It is difficult to predict the extent or future cost of climate change.

One of the delegates from the IFTA conference emailed me in April to say that in eastern North America blossom was five weeks early this year and that they were employing six helicopters, 18 wind machines, 1200 orchard heaters and trickle irrigation to try and keep the frost off the trees. It transpires that he estimates losses of 70-90% of the crop across the whole eastern side of the USA.

The potential effects of climate change on top fruit production were encapsulated by Fernando Santibanez of the University of Chile at the IFTA conference:



CHALLENGE	ACTION
Higher water requirements	More efficient irrigation
Dehydration & sun scald	Better canopy management
Pollinator problems	Change pollinators
More aggressive pests & diseases	Integrated management systems
Soil pathogens	More resistant rootstocks
More variable climate	Early warning system
Increased temperature stress	Stress reduction mechanisms
Shortening of the cycle	Change of varieties
Lesser fruit quality	Reallocation of varieties
Low Yield	Optimisation of production systems



6g. Post harvest costs

In New Zealand I was told that growers get paid around NZ\$3.5/carton for apples but the cost of getting it free on board the ship (FOB) was NZ\$12.5/carton. Similarly in Chile production costs for apples are US\$5.4/carton and US\$13.81 FOB whilst cherries are US\$5.1/5KG to produce and US\$15.6 FOB. These models do not include long storage periods and **I was shocked at how much these “on costs” exceeded the orchard expenses, one process taking a whole season and the other in many cases just a few days.**

shocked at how
much the “on
costs” exceeded
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Overall I felt that the costs challenges that we as growers in the UK face are pretty universal although countries such as Chile are starting from a slightly lower base.



7. Vertical integration - climbing the supply chain

One of the clearest trends I observed in New Zealand was that following a decade of consolidation of top fruit producers, **all** the remaining growers that I met had financial involvement and in many cases full control of the packing or processing and sales of their top grade fruit. In **Chile, Antonio Walker** stated that 98% of top fruit is sold by the growers and only one small time trader existed.

At the Brisbane Food Fair the three key trends were for local food, healthy alternatives and cider. This was reinforced by the popularity of the suburban farmers' market that I visited in Sydney, Australia. American delegates from IFTA also confirmed that local food was the latest big thing in the States and the CATF was a showcase for food grown in individual Chinese provinces.

7a. Case Study – Yealands Winery, Seddon, Marlborough New Zealand

The CSC delegates called at Yealands en route to Hamner Springs and I was sufficiently interested to make a return visit and have a more thorough look around.

Peter Yealands is certainly not the corporate type and met me in reception, unshaven with long grey hair and wearing a T shirt and shorts. He apparently describes himself as a “basic Kiwi”; to me he was a breath of fresh air and very inspiring. His concept is for large scale viticulture and wine production, using bulk containers to export the wine globally.

The 1000Ha estate has 850Ha of vines. Planting started in 2002 when hillside land was purchased as a cheaper option but Peter Yealands also appreciated it would give the benefit of improved quality grapes and, with its proximity to the sea, a frost free location. Planting was efficiently undertaken using GPS technology. Early harvests of Sauvignon Blanc were sold for NZ\$3800 which gave Yealands the green light to further borrow against an asset base appreciating at 20% year on year.

I saw many abandoned vineyards around Marlborough and prices have since bombed to NZ\$1200/tonne. **Peter Mann** assured me, though, that the business remained profitable mainly because of massive economies of scale and its own sourcing of fruit to supply a centrally placed winery only ten minutes away from most of the plots. With varieties that ripen close together they reckon to harvest within a ten day period and predicted a total of 13,000 tonnes in 2013. Certainly the production facilities are immense. Two 30-tonne intake hoppers lead to a crusher plant with the juice then being pumped into the 11 million litres of tank storage. Individual tanks of up to 175,000 litres are housed in a massive, chilled, moon shaped building. Individual glycerol-filled pipes surround the girth of the tanks allowing them to be heated or chilled according to the requirements of the wine making process. Altogether there has been a NZ\$30 million investment which is a huge amount in a volatile world wine market.

With its sustainable credentials and massive scale, Yealands in a remarkable operation.



Storage vats in Yealands winery



7b. Eden Agriculture (China) Co Ltd -

This business operates out of Zhongxing Town, Dujiangyang, Sichuan, China.

I was shown around **Eden Agriculture (Kiwi) Co. Ltd** by **Du Yigang**. He was immaculately turned out with dark, slicked back hair, a dark trench coat and suit. The company has over 1800 suppliers and claimed to have 20,000 tonnes of cold storage capacity. All orchards are organic and reliant entirely upon hand labour.

They mainly targeted premium Chinese and export markets for fresh fruit but are starting to concentrate more upon kiwi wine production. The kiwi fruit is crushed and “soured” in large porcelain vats. The packing plant was fairly basic and labour intensive.



Kiwi fruit wine fermented in porcelain vats beneath the Eden kiwi packing plant

I visited many other interesting processing plants during my travels. The largest was Enza Foods who kindly allowed me to tour both their Nelson and Havelock North plants. Following deregulation in the New Zealand fruit industry they are now a stand-alone business but interestingly are starting to offer “grow to process” contracts to ensure security of supply. They have an impressive range of fruit-based products including kids’ snacks, lollipops and apple sauces.



Stu Tucker in Beulah, near Nelson, showed me around his apple crisp making operation and



Stu Tucker and his range of apple crisps

told me that it came about following successive poor sales of their Golden Delicious apples.



Whilst driving about Hawkes Bay one afternoon, I stumbled upon the legendary “Ebro” growing system and sought the owner who turned out to be **Mike McCabe**, the largest cider maker in New Zealand. He produces 600,000 litres of Kingston cider on site every year and reports that business is booming. He has just planted Kingston Black cider apple trees on a M9 (dwarfing) rootstock, the only ones I have ever seen other than those in my own trial orchard.

The rising popularity of cider was also in evidence at **Redwood Valley Cider**, near Nelson, with an impressive scale of investment. **David Sax** explained that their process was similar to wine production with the cider then being diluted with water and fruit such as feijoa or blackcurrant often supplemented.

I also was very impressed with the **Schroeder family** bodega winery in Patagonia which relied entirely upon gravity flow in their winemaking process.

Many of the packhouses were very impressive, particularly the **Heartland** group, **Wai West** in Nelson and **Schio** in Brazil, all of which had grower shareholders.

In Australia, Peter **Korczynski** discussed the importance of marketing his passion fruit to hit premium Christmas prices in Brisbane, and this also applied to **Scott Samwell’s** sprout sales. **Geoff Bugden of Wilson River Pecans** chose to trade pecans into China.

I also had the pleasure of visiting **R CERAVOLO & CO** at Valle Di Sant Antonio in the Adelaide hills. They had a wonderful apple juicing plant.



Juicing plant A R Ceravolo & Co



Several growers such as **Francisco Pratt**, **Puablo Kleppe** and **Geoff Bugden** also integrate further down the supply chain by maintaining their own tree nurseries.



8. Marketing – local versus global?

Deciding on the title of my Nuffield project was hampered by the fact that every time I put the word “apple” into a search engine it threw up a load of computers and i-players! Several people have assumed that I work in computer retail when I tell them that I recently built an apple store. This signifies a massive disconnect between our product and our consumers and that they crave something more exciting that they can engage with.

En route to Sydney University I dropped into a major retail store to look at packaging in the perfume department. I was amazed to find a picture (see below) of a woman eating a Golden Delicious. This was in fact an advert for an apple-sized and shaped bottle of perfume that was being flogged for fifty quid.



Added value retailing



These retail and marketing organisations have hijacked all the positive attributes of the fruit which we grow and superimposed them on their lifestyle products. Their saturated use of fruit in advertising can hamper marketing ideas for real fruit promotions.

During the CSC we visited the Oceana gold mine near Reefton and stared down into a 600 metre hole that used to be a 900 metre mountain. In 2008, 13,808,609 tonnes of rock was moved and the ore transported 850Km by road and train to the southern end of the South Island to extract 2.24T of gold! It is difficult to rationalise the environmental and financial cost attached to mining a vanity product superfluous to humanity's needs.



Oceana gold mine at Reefton, Australia

100% PURE NEW ZEALAND

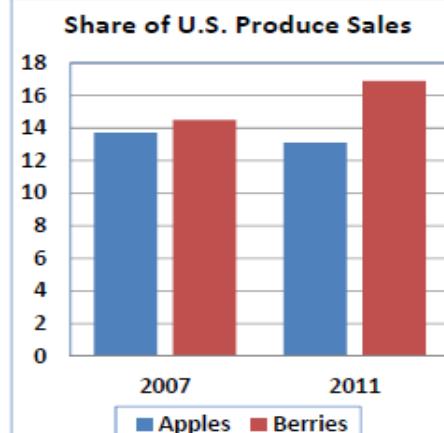
Pure New Zealand

If your body is your temple then what is more important, that which you put into it or that which you use to adorn it?

The demise of consumption of fresh apples in the developed world was highlighted by Desmond O'Rourke in the chart below:

World Apple Industry Challenges

- The biggest single problem for the apple industry is the decline of per capita fresh consumption in major developed markets.
- Customers are aging.
- Rising competition from berries, exotic fruits, new snack products. No recession for berries.





8a. Supplying the local market

If all the food market trends suggest an increase in demand for local food then perhaps we need to try and understand why so many strategies have been tried in the past and failed.

A club variety is launched with coordination between various parties such as fruit tree breeders, nurseries, growers and marketing companies.

Costs are invariably much higher, particularly to the grower, and there is a steep learning curve.

It is difficult to match controlled supply with potential demand and the new variety tends to have only a substitution effect with existing product. It is not often that you unearth a real gem.

The main problem with organic apples is that the market is stagnant at around 7% and when supply increases, premiums rapidly drop.

Added value areas such as the slicing market have been derailed as a 100% mark-up is too high for a process that can be done in house and Macdonalds reduced their requirements.

With the demise of “powerhouse” marketing programmes such as the Washington Apple Commission, New Zealand’s Enza and South Africa’s Unifruco there is perhaps an opportunity for smaller programmes to promote own origins although this might not drive more overall sales of fresh apples.

The Brazilians are coping pretty well marketing to their own nation. They have planted sweeter apple varieties to supply the northern population who have a sweeter tooth because of the ample sugar cane at their disposal. The **Bom Jesus** co-operative is a small but well run local organisation and Rasip showed us smaller apples packaged in bags with cartoon characters, targeted at children.

See photo on next page of Rasip and the children's branded apples

Craig Hornblow in New Zealand genuinely believes that his favoured 2D growing system can “dial up production to make apples compete with Mars Bars as a snack”

8b. Supplying the export Market

I have already highlighted that future increases in the supply of apples will more than likely have to be met by increased demand from the Asian markets. By merely travelling in China and attending the CTF it was quite obvious that the Chinese have unique tastes. The wines that I tasted were quite acidic and the New Zealanders have ascertained that the Pacific series of apples suit their tastes.



Rasip and the children's branded apples

Beyond supplying cherries for the Chinese New Year I saw an innovative approach to adding value from Antonio Walker at his **La Chispa** orchards in the Rio Claro area of Chile. Thirty days before harvest he had placed 1 million red UV filters over apples at the top of the tree, followed by white bags a week later. This results in apples with an even rosy red glow which are worth a \$7 premium per box and are sold into Taiwan and China.



Premium sun blushed apples



Chinese marketing in need of some refinement

As you can see from the photograph above, the Chinese have taken this a step further and used a UV label to filter out writing on the apple's skin. However I think they need to research their marketing a bit more thoroughly.



Gary Jones at **Pipfruit New Zealand** explained to me their four major strategic areas of operation, three of which are marketing orientated. They are:-

- **Adding value to existing production**

Fruit futures ensures nil pesticide residues to give the safest fruit in the world. Pesticides are measured in parts per billion.

Complementary branding works in tandem with the New Zealand tourism campaign. Their tag line is “100% pure apples from New Zealand”. See www.produceofnewzealand.org.

Pipfruit NZ also research and provide marketing intelligence and host a marketing panel.

- **New Varieties**

There has been a modest return on new varieties to date e.g. Smitten, but they view this area as the engine room of the future. Work is done in conjunction with **PREVAR**. Due to the cost of production and distance from market premium varieties are necessary to avoid the commodity trap.

Their alternative approach is via the global breeding programmes however there are major concerns over the reduced control of commercialisation. This was seen with the widespread planting of Royal Gala which doubled the area in the USA and along with the use of SmartFresh¹, extended their selling season to the end of June instead of April. Clearly this reduces opportunities for the Southern hemisphere importers and reinforces Pipfruit NZ's belief that they need to commercialise new varieties to re-open this window

See photo on next page: a pink flesh apple on trial with Fleuren in Holland

- **Market access**

Pipfruit New Zealand offer guidance and advice on rules, regulations & eligibility of fruit in 65 different countries. They recently influenced the WTO regarding the Australians who historically would not import apples that had streptomycin antibiotic added at flowering for fire blight. Remarkably, 75% of research spend is on access issues

¹ SmartFresh works by restricting the apples' sensitivity to ethylene, thus helping apples to retain their firmness and acidity. Apples treated with the product not only remain flavourful and crisp but also retain their nutritional value. Apples are treated by releasing SmartFresh into an airtight enclosure, where the apples remain for 24 hours. The apples are treated within 3-5 days of harvest. Research shows that, once treated with SmartFresh, apples retain their quality, even without refrigeration.



A pink flesh apple on trial with Fleuren in Holland

- **People in industry and training**

Gary Jones is passionate about encouraging youngsters into the industry and is very keen to set up some form of exchange programme. He also stressed the need for the right people throughout the industry, pointing out that good work by growers can be undone by poor marketing.



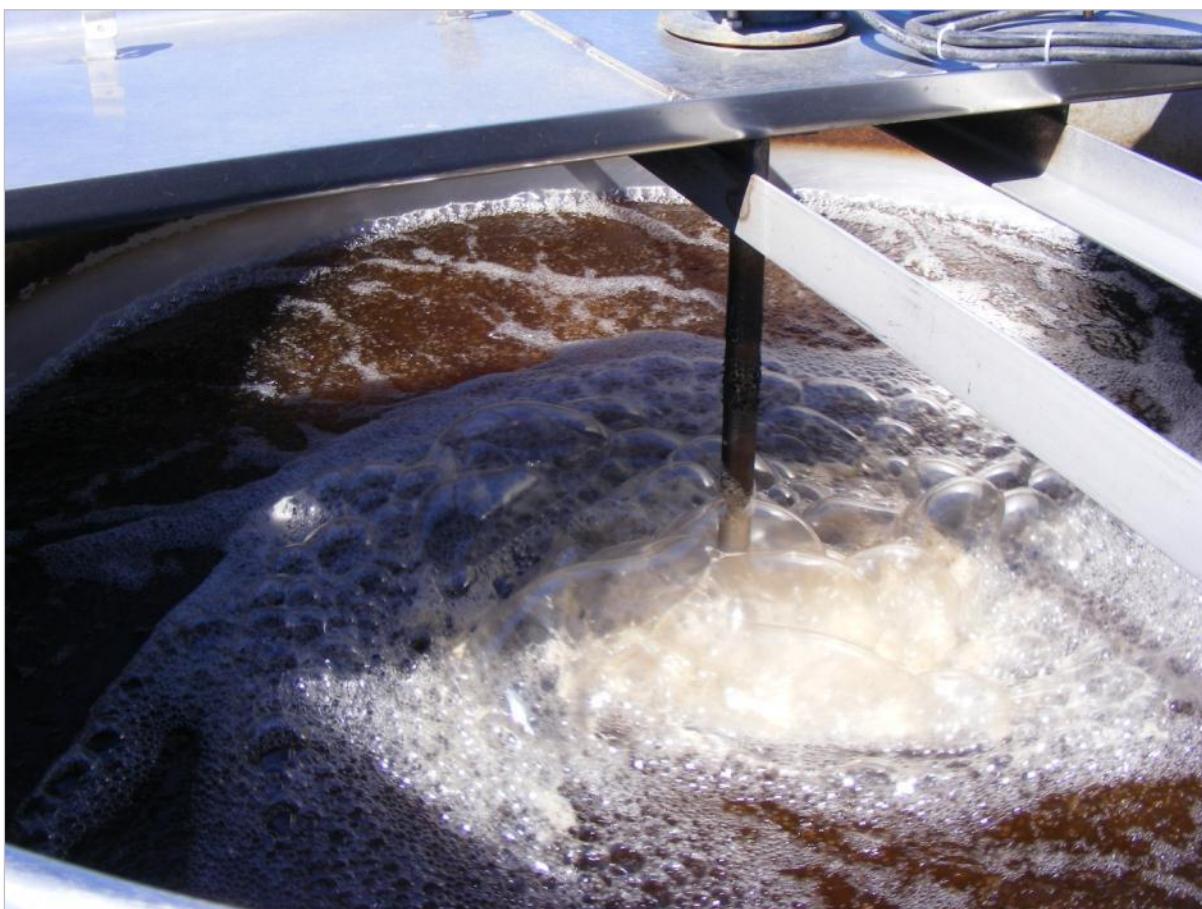
9. Biological farming solutions

Electromagnetic scanning and soil mapping my orchards had led to a better understanding of the chemistry in my soil but I realised that we didn't have a real handle on the biology.

Before setting out on my Nuffield adventures I had purchased a mower that creates mulch under trees in the orchards, and had also purchased a small compost tea brewer but that was about it. When I mentioned this to Julian Raine in Nelson, he suggested that I should visit the **Seresin** wine estate in Marlborough. All he said was "I don't know how they do it but something works". **Colin Ross** gave me a whirlwind tour and my first introduction to biodynamic farming.

I was told how good wine is a reflection of the land from where it is grown. The centrepiece of the vineyard is a 3000 litre compost tea brewer in which compost, seaweed and lime are brewed. Five hundred tonnes of compost are produced on the estate each year with twenty one pits of cow dung where the muck is turned three times a year.

Seresin aim for "*Farming ease not fighting disease*".



3000 litre compost tea brewer at Sorensen Estate



At **Massey University** I met a PHD student undertaking a remarkable study focusing on the dynamics of carbon in apple orchards; how to reliably measure this carbon, and integrate it in Life Cycle Assessment (LCA). Although fascinated at the time I did not realise until later in my travels just how important this work might become. It is really one of those meetings I would love to revisit.

He told me how carbon footprinting took no account of soil carbon. He was using EC scanning to identify sample sites but felt that readings might have to be retaken as frequently as five years apart. To date his research suggests readings of 12T carbon/ha in standing orchards but new dwarfing varieties have led to a depletion in orchard carbon, with 80% of carbon lost to fruit. Compost was being added to orchards for nutrition trials but the greater benefits given by increased soil carbon were soon discovered.

two experiences
entirely changed my
travel plans

The two experiences detailed above were sufficient for me to entirely change my travel plans.

Enthused and enlightened I went to Queensland to take part in the excellent **Nutri-Tech Solutions 4-day course** in sustainable agriculture and gain the relevant certificate. (<http://www.nutri-tech.com.au/index.html>)

The main premise was that conventional farming is not conventional but just a long term experiment built up over three generations. We were told that we are dealing with a living soil harbouring hidden livestock - a furtive workforce. However that requires a health and safety policy, feed for wellbeing, and protection against chemicals. **Graham Sait**, who is renowned in this arena, started NTS eighteen years ago and runs the course. He stated that **chemical farming involves a reactive response based on fear whereas biological farming is proactive.**

He advocates separating soil management skills into three separate categories:-

- **Mineral Management**

Mainly based around **Professor William Albrecht's** cation balancing approach, NTS have developed a "soil therapy" programme. It sets out to educate growers, take appropriate soil tests, interpret these accordingly, add a prescription blend of fertilisers, humates and composts, and then tests the effect on plants with field instruments such as sap ph meters, refractometers and infra red thermometers. Any crop deficiencies are supplemented with foliar feeds.

- **Microbe management**

Graham Sait describes this as "the essence of biological farming or "fusion farming", as we term our best-of-both-worlds approach". There are three principles to accept before making the shift to microbial management:



- i. Conventional farming is self serving and input driven
- ii. Success in fusion farming is more knowledge driven than input driven
- iii. There is a direct relationship between nutrition and pest and disease pressure

There is an essential “microbial bridge” that needs to be maintained between the soil and the plants. One thousand and nine pages of Professor William Jackson’s report on the subject can be best summarised in one quote. “Micro-organisms’ activity in one healthy hectare uses the same energy in soil preparations as 10,000 people would burn for the same work. We must nourish, protect and stimulate this invisible workforce.”

- **Pest and disease management**

Exploring proactive approaches to pest management was summarised in an integrated pest management programme (IPM).

Many of the strategies were directly linked to previously discussed mineral and microbial sections.

One of the starker claims made was that **modern global agriculture is responsible for 25% of the world's CO₂ emissions, 60% of the methane gas and 80% of nitrous oxide.**

We were then given a remarkable interpretation of this statement and an understanding that carbon must either exist in the atmosphere, vegetation or the soil.

THERE IS A HUGE OPPORTUNITY FOR AGRICULTURE TO SPEARHEAD THE SEQUESTRATION OF CARBON INTO THE SOIL.

There was one final perspective that has really eluded me in the past. If we are dealing with nutrient depleted soils then it follows that we are likely to be growing nutrient deficient foods. **Brian McClean**, a soil scientist with whom I spent an enthralling afternoon in Adelaide, holds the view that it is not chemicals in food that are causing health problems but insufficient vitamins and minerals.

This is backed up by masses of data from USDA's database:
<http://www.ars.usda.gov/Services/docs.htm?docid=8964>

Recent World Health Organisation reports surprisingly find a lot of type B malnutrition in developed countries, which can likely be traced back to a lack of minerals and biology in the soil and insufficient beneficial biology in the human gut.

Does the old maxim “An apple a day keeps the doctor away” lose credibility when we offer fruit pumped up with nitrates and water?



Conjecture can be inspiring but after the NTS course I arranged an itinerary to meet growers who had attended recent courses to see whether they had been able to put theory into practice.

Peter Korczynski grows passion fruit in the Glass Mountain region of Queensland. What impressed me most was how well the four week old vines had established. The roots had been dipped in a solution of kelp & humates inoculated with mycorrhizal fungi and Trichoderma.



New plantings in Peter Korczynski's orchard

Kym Green NSch is a biodynamic grower from the Adelaide hills who is well known in Nuffield circles. Kym immediately caught my attention with figures showing that biologically farmed soils average 3–4° warmer.

One thing that struck me about Kym is that he appears to be always trying something new. Having broadcast a seed mixture of peas, beans, vegetables and oats to cut and spread with a slasher mower, he was already planning to plant cocksfoot because of its fungal-dominant decomposition. Kym maintains that it's all about pack out and price and that the quality of his fruit has significantly increased since he switched to biological farming. He does not want to be referred to as an organic farmer because he feels that he does a lot more beyond that standard.

He aims for 5-6 fruit per cm of branch cross sectional area.



I could not write about the visit without mentioning Kym's world renowned KGB (Kym Green Bush) cherry growing system. Most cherry trees have 8 limbs (12% nutrient supplied to each). The KGB system has 30 limbs (3% assimilate to each limb) and you prune the strongest one each year. This is a "pedestrian" system which is generally cheaper to harvest. Kym uses a large range of biological products but over the years has cheapened the costs with his own formulations.

I do not truly understand many of the activities undertaken by biodynamic growers but what I do know is that what I saw them achieving was very impressive. At the very least, their micro management and attention to details yield huge benefits.



Kym Green



Scott Samwell

Scott Samwell is a sprout farmer from just south of the Adelaide hills. He was due to attend the CSC with us but had to postpone his Scholarship because of a basketball injury.

Scott runs an extremely impressive operation. It is quite remarkable that he can grow Brussels sprouts for the Christmas market. A walk around his fertiliser store shows just how organised their operation is and, like Kym Green, he uses a lot of fishmeal blended with kelp and seaweeds to reduce costs. He referred me to something Gary Zimmer had said:
"Organic farming is marketing oriented around what is excluded, whilst fusion farming is all about what is included."

Scott told me that on completing the NTS course, he rushed into all sorts of initiatives and made a couple of fundamental cockups. He soon discovered that making compost teas commercially was difficult because you were forever having to plan forwards when starting a brew. He has found the use of innoculums more effective as they are more predictable and easier to handle. Certainly this is the case for fungal-dominated brews that are more suitable for trees because there is less risk of damaging the fungal hyphae whilst spraying because you are actually only spraying the spores.

A biological farming revolution is unlikely to happen overnight as there are very few farming leaders who are willing to champion this cause and a lack of research and training will engender a cautious approach from growers who, understandably, are unlikely to want to risk their livelihood merely to be regarded as an early adopter.



A portable sap PH tester



10. Conclusions

1. Future global markets will influence further diversification away from more traditional apples and into higher value top fruits such as cherries.
2. Top fruit growers not integrated with the fruit supply chain will miss opportunities to strip out proportionately larger “upstream costs”, add value to their fruit and explore processing options, whilst remaining price takers. There was conclusive evidence in the southern hemisphere that there was need to strip out costs by cutting out the middleman.
3. We must re-engage consumers and redefine high quality top fruit. A new emphasis should be placed upon **what we can do** for our customers through initiatives such as growing nutrient rich fruit rather than merely paying lip service to the former.
4. Biological farming techniques should be revisited with a view to increasing top fruit quality, adding value, reacting to escalating fossil fuel costs and as a reaction to, and partial resolution of, climate change.
5. Future success in growing fruit will depend largely upon mitigating uncontrollable cost increases caused by outside factors. Investment in precision technology, mechanisation, new planting systems, training and research will be vital to curb escalating top fruit growing costs and remain competitive.



11. Recommendations

1. Hard decisions may be required to assess the viability of existing efficient and modern dessert apple orchards, whilst older orchards may become redundant. It will be important to plan where and how future production will be sold and it's worth considering now whether to chase new export opportunities or campaign with the "local" message. Cider apple growers, with long term contracts, may consider themselves immune to global influences; however these are sure to have some influence upon prices paid. Much will depend upon the demographic time bomb of the increasing average age of UK fruit farmers. A clear vision of where you want your business to be in a decade's time will help significantly in making robust decisions on investments in planting systems and varietal choice or, perhaps more wisely, diversification into other top fruit production or new enterprises.
2. Integration up the supply chain is easier said than done, particularly in a financially underperforming sector. I cannot make a recommendation that will suit every grower's individual circumstances. However around the world I have observed that the majority of the successful remaining top fruit companies have had to integrate simply to survive. One thing continually pointed out to me was that the sum given to growers for their fruit was significantly lower than the price paid for getting it to the consumer. I was told by all the growers with the most successful value added initiatives (such as top quality UV bagged fruit, apple crisps and fruit pressing plants) that these would not have come about without integration and direct customer contact. Land prices will deter new entrants who will not have a choice but to develop additional income streams in order to succeed.
3. The study tour has left me with the view that, as growers, we have an obligation to maximise the health and nutritional benefits of our existing top fruit crops. This will be pointless unless we engage with the consumer and create excitement about what we are doing for them. Opportunities should also be sought with further development of the "grow to process" model by growing fruit that increasingly fulfils the customers' needs rather than being a cheap "cull" fruit discarded by retail markets. We must target local and innovative niche markets for our fruit.
4. Without becoming seduced by the "fusion farming" cause, we should at the very least challenge the chemical farming paradigm and what have, over three generations, become the traditional farming techniques. I was consistently advised that the products most likely to have an impact upon profitability and sustainability were microbial inoculants and humates.

I recommend that we take a pragmatic approach to trialling biological farming techniques although a bold leap of faith is required to put behind us much of what we have been taught. Overwhelmingly the biggest gain from a switch to a



biological approach is carbon sequestration into soil. The potential value of this to the fruit and wider agricultural industry must not be underestimated and we should support all initiatives to exploit this.

5. Growers should look to other industries to learn how to reduce the burden and cost of labour in top fruit orchards. The use of mechanised harvesting rigs, precision technology, new varieties and more efficient planting systems will all play their part.

Strategies to reduce the burden of fossil fuels must also be implemented. Too often efficiency improvements are shaved off the price growers is paid and so I also advocate a strategy to spread costs over larger outputs and higher value products.



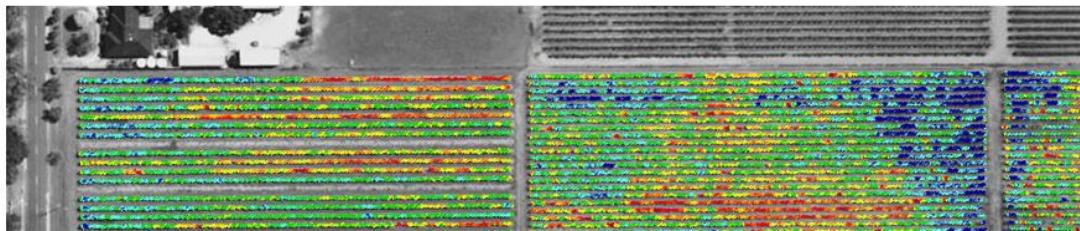
12. Study outcomes : what will change for me following my study tour?

My study tour is still only recent history but already there has been a major change in my business.

- ❖ Since visiting New Zealand in March 2011, I have built a controlled atmosphere fruit store capable of holding 1800 bins of apples.
- ❖ For the future I am setting up trials in biological farming and already looking at new innovative markets for my fruit.

Adopting a new perspective:

At the outset of this report I described the “tunnel vision” of day to day running of top fruit orchards. The Nuffield experience has given me a new outlook for my business, which is exemplified by Dr Paul Dare of Spatial Scientific with his aerial perspective of orchard management.



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13. Appendix: - Travel diary

- 12/03/11 – John Palmer – Nelson New Zealand
- 13/03/11 - Julian Raine– Way West Horticulture Ltd
- 14/03/11 - Brendon Osborn – Heartland Fruit NZ (Levy's fruit)
Kelvin Lacombe – Compass Fruit
David Easton
Richard Howdy - Veolia farms
Alan Dobie – Fresh Nelson
- 15/03/11 Rob Oldham – Willis Brook Orchard
- 16/03/11 Enzi Foods
Clayton McIntyre, Alan Warne (John Sauer)
Enzi International – Chris Hales, Craig Hornblow (Ageist)
Tim Williams – Braeburn Orchards
- 17/03/11 Redwood Valley Cider: Justin, Murphy Hyssop, David Sax
Nagasaki Horticulture – Luke Hawthorne
Andrew Liniment – Shoddy's (David Howdy)
Stu Tucker - Beulah
- 18/3/2011 Peter Mann – Elands
Colin Ross – Seresin Estate
Sean Phillips (head Woofer) + Aeron (apprentice) + Lisa
- 19-20/3/11 Craig Mackenzie – Greenvale Farm
- 21/03/11 Ian Yule – Massey University –Palmerston North
Caroline Headley – Land care soil scientist
Dr David Manteo, Nigel Banks – Hurt info
Canine Thomson, Hayden Lawrence – Spatial solutions
Brent Clothier, Steve Green
Eduard Perie
Jason Wargent – Massey university senior lecturer fruit production
Rory C Flemmer
- 22/03/11 Brett Ennis – PREVAR – Hastings Hawks Bay
Simon Bale – ENZA International
Peter Beaten - Chief Executive Pipfruit New Zealand
- 23/03/11 Stuart Tustin Plant & Research: Hawks Bay Research Centre
John Marks ENZA foods
- 24/03/11 Gary Jones Pipfruit NZ, MR Apple Hawks Bay



	Mike McCabe – Kingston Cider
25/03/11	Mountain biking/return home
30/10/11	Chinese Agriculture Trade Fair Chengdu
01/11/11	Sichuan Province Department of Agriculture Huang Jingling and Zhang Xiaoping
02/11/11	Cherry CBBC China-Britain Business Consul Chengdu Agriculture committee – Jin Shushing Investment Promotion Commission – Zhang Zigong Miss Lee – Fruit – Processing and growing Leah Liu - Translator
03/11/11	During Yan Luis Guan Guy Dujiangyan agriculture committee deputy director Du Yigang –Edon Agriculture (Kiwi) Co. Ltd Bruce – Rainbow dept store Harry Xu – Dole China
04/11/11	Wenjiang – Chengdu Agriculture & Forestry Research Institute Dr Tu – Food processing expert Mr Zheng – Director of institute Mr Jang – Division Chief •
6-9/11/11	Nutri Tech Solutions - Certificate in Sustainable Agriculture
09/11/11	Geoff & Debbie Bugden – Wilson River Pecans, Richmond Hill NSW 2480
10/11/11	Onyx Park – Susan Rodger Peter Korczynski – Glasshouse Mountains
15/11/11	Visited Perfumery in Sydney & found Golden Delicious! Brett Whelan – Australian Centre for Precision Agriculture, University of Sydney
16/11/11	Kym Green
17/11/11	Sean Mulvaney Croplands Brian Macleod – APAL Labs Adelaide R CERAVOLO & CO – Valle Di Sant Antonio
17/11/11	Mt Bera Vineyards – Greg Horner
18/11/11	Dr Paul Dare - Spatial Scientific Scott Samwell



- 08-10/01/12 IFTA 55th Annual Conference Santiago Chile
- 11/01/12 Univiveros – Nursery - Maipo Valley, Chile
Agricola Garces – San Francisco de Mostazal – Chile
- 12/01/12 La Matriz Orchards – La Montana area (am) La Chispa Orchards Molina Rio
Claro (pm) , - Antonio Walker (President Fediruta F.G. Chile, Agricola Matriz LTDA, Agropecuaria Wapri S.A)
Inspection Site Teno
- 13/01/12 Travel to Los Angeles, southern Chile
Santa Olge Orchards - Diego
- 14/01/11 Fransisco Prat Buenos Aires De Angol Nursery
Buenos Aires De Angol – Orchards
- 15/01/12 Transit to Nequen, Argentinia via Pucon
- 16/01/12 Nequen Argentina
INTA (Instituto Nacional De Technologia Agropecuaria)
Doctor Henrique Sanchez
Salentein Fruit – packhouse farm – Henrique Ramos
Salentein fruit – Farm 141 – JJ Gomez
Neuquen Irrigation
Cervi – Pablo, Christina, Jorge Cervi
Familia Schroeder
- 17/01/12 Kleppe S.A. – Gustavo Perez
El Cadero farm
- 18/01/12 Travel Neuquen to Vacaria (Brazil)
- 19/01/12 Capao Ralo Orchard – Joaquim Lisboa Boeira Junior, Bom Jesus
Frutamil Orchard – Artur Michelon Bom Jesus area
Schio Pack house – Vacaria
Santana Orchard – Marcus De Rossi – Schio
Frutival – Marcos Dal Piaz
Rasip Agro Pastoril S.A. – Jan Meyer
Lazzeri Orchard
- 20/01/12 Sao Luiz Orchard – Fumio & Hiroyasu / Celito Hiragami
Pinheiros Altos Orchard
Sao Joaquin fruit farm & Epagari research Station
- 21/01/12 Florianopolis – BEACH



Depart Heathrow

24-25/02/12 Fruchtwelt Bodensee, Friedrichshafen, Germany

20/06/12 Rene Nicolai NV, Alken, Belgium - Florent Geerdens

EIGN PREVAR link

Jeff Vercammen – PC Fruit Sint Truiden

21/06/12 Robert Janssen – Deest Holland

Willie Bowmans –

Sjaak Walraven – Fleuren, Baarlo Holland

Gortz farms - Baarlo