Kiwifruit in the next 35 years

Who is guiding the research to get there?

Chris Anstis

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1 Introduction

Where will the Kiwifruit industry be in the next 35 years? We cannot predict all the challenges that it will face, but there may be some that can be foreseen and all the facets of the industry will have to be managed through them. The same for opportunities, there will be

Who is guiding the industry on the long term to ensure that the breeders, marketers, and governments are all on the same page and heading in the same direction.

This report will attempt to take four pillars of influence and see how they will influence the long term kiwifruit industry. These three pillars I have chosen are Researchers, Zespri Marketing and R+D and Ministry of Primary Industry.

This multi faceted wheel shows some of the trends that are emerging that companies will have to deal with over the next decade. In fact, most of them are on the agenda now.

Figure 1 - Fresh Fruit & Vegetables > Trends (CBI - Ministry of Foreign Affairs of the Netherlands, 2014)

Who is going to be steering the research over the next 30 years, so that New Zealand's primary industry is ahead of the curve in the major factors that will influence the market place we sell into, and the farmland that we produce the produce on?

2 The report

2.1 Research (Jacqueline Rowarth)

Jacqueline is a professor of economics at the Waikato University with an Agricultural Science degree with Honours and a PhD in Soil Science. (Waikato University Bio)

2.1.1 The Science

New Zealand is underfunded in core science. With not enough focus on general long term research and not enough focus on getting young people into science. The focus is on short term, high chance of success, quick to market, and high chance of return on investment projects. (Rowarth, 2014)

The bulk of the research in New Zealand is funded out of industry, as only '*about 40% of the CRI's funding comes from government*'. Plant and Food core funding is closer to 50% (Plant and Food Annual Report, 2013)

This shorter term view on research suits the industries at a general level, as they get the more immediate return for the growers and stakeholders in the industry. The primary growth partnership programmes are good examples of shorter term research in the primary sector in New Zealand.

One of the main drivers for this is funding.

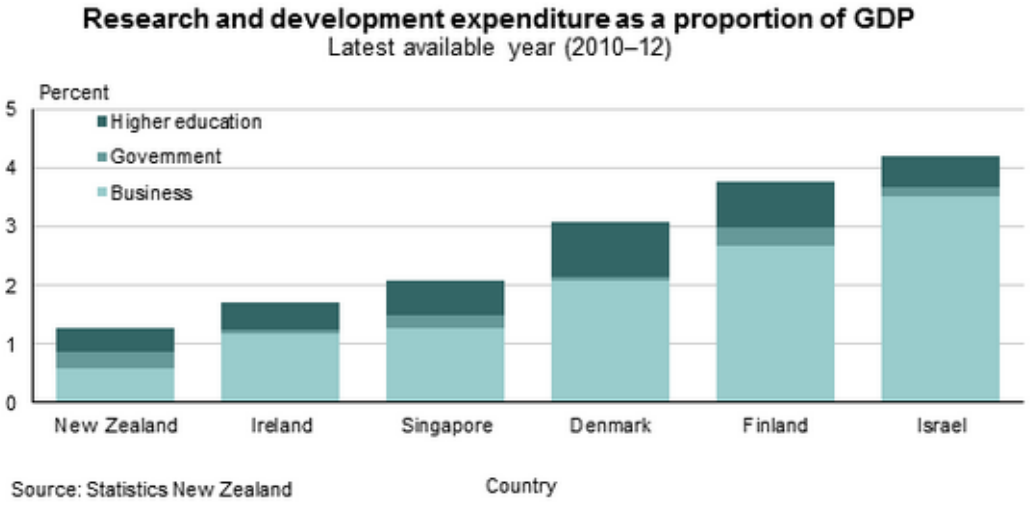

Figure 2 - R+D Expenditure as a proportion of GDP (Statistics New Zealand, 2012)

New Zealand has one of the lowest R+D funding of compared to comparable countries around the world.

2.1.2 People

There is a shortage of people coming though into the sciences in New Zealand.

"The number of university graduates in agriculture-related fields has dropped in recent years.

Of the 22,820 undergraduate degrees awarded to domestic students across the country in 2011, only 68 were for agricultural sciences and 90 were for farm and agribusiness management students.

Meanwhile, performing arts turned out 650 students, philosophy 424, and mathematics 334.

Dairy NZ estimates an annual need of 1250 agriculture-related graduates to keep the industry healthy and growing." (Stuff.co.nz - Kashka Tunstall, 2013)

In 2013, according to (Education Counts, 2014) there were 211,300 students enrolled in a Bachelors degree and higher. Of that 39,250 were enrolled in Chemical, Earth, Biological and other Natural Sciences; roughly 19% of students. 3215 were Agriculture, Horticulture, Fisheries; 2% of students. (I excluded Environmental students, another 3700. The Creative Arts have 35,000 enrolments, or 17%.

By dividing the GDP per sector by the enrolled students, you see that the Agribusiness sector is $315,000 per student, whereas the creative arts are only $89,000 of GDP per student.

Jackie thinks that there needs to be a couple of changes to get more people coming though university with science / agribusiness based qualifications.

a) More aggressively adjust the level of funding the government provides for each degree, change the funding in areas that there is 'more/less value' derived from each degree
b) The agribusiness industry needs to do a better job at advertising itself to draw people though the system.

The above two points are happening now at some level, the 2014 Budget has allowed Steven Joyce to live the Science and Agriculture tuition fees by 8.5% each (Joyce, 2014). There is little that can be done about changing it, but we still lose the best and brightest PhD's to the private sector where the money is better.

The Max Plank Institute's work on innovation and entrepreneur has shown that people 'hit their stride' in their mid 40's to early 60's, this is also the same with researchers. It is when people have cumulated years of experience and have wide ranging networks to tap into. These networks are a great value to research. But there may be concern that some of those networks could be 'hampered' due to the competitive nature of the research grants. Research scientists may be less inclined to discuss thoughts and findings due to the risk of losing their 'IP' so to speak. Also projects are more inclined to get the best, 'most specific' scientists involved; but lose out on having scientists that have less detailed study, but more cross field experience to draw on. Jackie fears there is not enough bridging of fields, not enough crossover of the likes of soil science and agronomy at a deep rooted science skill-set.

This could be a challenge to keep performing the long term research that is done, when funding for shorter term research has increased. But greater synergies between universities and other research agencies, like the proposed Lincoln Hub, will stretch the limited resources more efficiently so we continue to get the most out of the research dollar.

2.2 Zespri and Kiwifruit

2.2.1 The Marketing

Consumer demands are what steers Zespri's decisions. Zespri is a consumer centric kiwifruit marketing organisation, and, in conjunction with Plant and Food Research, deliver the world's best Kiwifruit.

They conduct research to find out what consumers will be demanding in the future, and gear the research towards that. Currently the market research is indicating that consumers are demanding more 'convenience', which is interpreted as 'a consistently great eating experience every time'. This is a slightly different interpretation from what New Zealanders would deem 'convenience' to mean. (Palmer, 2014) That is on top of their standard demands of taste, quality and healthiness.

The future consumers will still be demanding fresh, good quality, healthy produce. The increasing ageing population and the increasing 'grab and go' lifestyle is creating the demand for healthy and a 'ready to go/eat' fruit experience.

Zespri are tapping into the increase in consumers that want to eat healthier. It is 'cool' now to eat healthy. (Kasriel-Alexander, 2014)

This focus by Zespri is on the consumer is vital as they are the people who will be buying the fruit. It is much easier to sell products to an audience who want what you are selling.

2.2.2 Zespri R & D

Zespri has a close working relationship with Plant and Food Research (a Crown Research Institute).

Zespri have an annual $15 million dollar R&D budget, and this is split 3 ways. It is intended to be about 50% of the funding on 'here and now' issues, such as production research into the Gold3 dry matter (flavour) issues and techniques growers can use to overcome it. 40% of the funding is spent on the medium term. This is a 5 to 15 year timeframe that encompasses some of the plant breeding timeframes. That leaves 10% of the funding on the long term, transformational research. Currently the spilt is pulled to the shorter timeframe due to pressures from Psa, so the split is actually at 60% short term, 37% medium and only 3% long term. (Tanner, 2014)

Much of the guidance of the research comes through from Zespri, as they are the ones funding it. (Indirectly, the growers are, as they are the owners of Zespri.) The guidance of the marketing team is feed through for targets for the Plant and Food scientists working on new cultivars.

There are other traits that also have to be met, while it is not 'difficult' to breed a great tasting kiwifruit, the plant has to produce enough fruit for the farmer to grow an economic crop. The plant has to also be pest and disease resistant, along with the ability to store in coolstore for an acceptable length of time. (One of the main factors in 'convenience' the consumer is after) Currently Zespri is the main driver for these, along with the internal knowledge and experience in Plant and Food as they reference the existing commercial varieties.

While the bulk of the research is done on new cultivar development, there are a number of other research areas that is done by Zespri, but is not covered in this report. They are; Sustainable production systems, Psa innovation, Sustainable delivery of fruit, and Value addition/creation.

2.2.3 Plant and Food (Bryan Parks)

Plant and Food is the major party involved with Zespri for plant research, as the new kiwifruit varieties is a large part of Zespri's research. It is the synergy that Plant and Food has with Zespri that provides robust oversight in guiding the research over the next 30 years.

Superior kiwifruit genetics are one of the main reasons Zespri invests so much in new variety research. The success of Hort16a variety is testament to that. But it is very rare for that to happen by chance, normally it is years and years of research and breeding to get to the successful varieties and managing this process is important to get an acceptable outcome.

As the funding for the new varieties comes from 2 distinct places, Zespri, and Plant and Food, there needs to be a coming together to manage the process. There is a New Cultivar Governance Group that is a 5 member panel consisting of very high level management that oversee the new variety programme. It consists of 2 people from Zespri, and 3 from Plant and Food. They interact with the steering groups that are working on various aspects of the new variety programme. (High level is the CEO and General Manager of Science and Innovation at Zespri)

(Parks, 2014)

There are 3 main phases of the breeding programme.

1. **Seedling phase**: Seedlings are monitored and assessed for fruit taste, size, shape, storage capabilities and shelf life as they grow. (there are 100,000 seedlings in review)
2. **Clonal phase**: After two years, the vines produce their first fruit for testing and evaluation including yield, resistance to pests and disease, harvest and eating windows and cost of production (there are about 200 different selections in review)
3. **Pre commercial phase**: The potential new varieties undergo extensive evaluation of their on-orchard in-market and supply chain performance to determine whether it makes good commercial and economic sense to commercialise them. (only a very limited number <10 get here, and most fail)

(Zespri, 2010)

Each of these phases have steering groups are cross functional teams with experience in fields that are best suited to the stages. In the seedling phase there is a greater input from marketing, as they are a trying to select traits that will satisfy the consumer in 10 to 15 years when these seedlings are in the marketplace. While the steering group at the pre commercial stage has more grower and post harvest input for their input on how the fruit handles in the real world. However these 3 stages only look at the medium term; what is decided before the seeding stage?

Product concepts

This is a stage that is guiding the 30+ year approach in the kiwifruit industry new varieties. There is a cross functional team of about 40 people that are there to get the ball rolling so to speak. If the marketing team required a blue kiwifruit, this team would initially find the pathway to the market for it. The team manages the deep concept and verification work and their timeframe stretches out to 2050. The group is largely and in house group, there is no representation from outside specifically. (Parks, 2014)

2.3 The Government (Alistair Mowat)

2.3.1 Ministry of Primary Industry overview

The Government has two distinct roles to play; to grow and to protect. (Mowat, 2014)

The government, in this case MPI have released a strategic plan that is out to 2030. They will focus on two main areas, firstly 'Maximise export opportunities and improve sector performance' and the second is to 'Increase sustainable resource use, and protect from biological risk'. To achieve what Mowat is saying above, they will be both and enabler and a partner. They will, among others, enable the sector performance by linking the private and public sectors on high value projects (PGP's), and enabling market access to seize opportunities. Being a partner will be the approach they take to protect. They will help by working with primary industry to optimise the sustainable use of their primary production assets, also by helping improve resilience and the timely management of risks. (Ministry for Primary Industries, 2012)

Success will be measured through increasing primary sectors contribution to GDP, increase in access to products and markets, increase in innovation, increase in productivity from Maori primary sector participants and both a reduction in the risk to and from the industry, and a reduction in the environmental impact. (Ministry for Primary Industries, 2012)

2.3.2 Government Research and Development funding in New Zealand

The Research and Development Survey: 2012 by Statistics New Zealand does show some of the trends that are happening in Research and Development. The highlights are below.

- Total research and development (R&D) expenditure was $2.6 billion, up 10 percent from 2010.
- Business R&D expenditure jumped by 23 percent, to reach $1.2 billion.
- Nearly half of businesses expected to pay back their R&D investment within two years.
- Government R&D expenditure dropped, but government funding of business R&D increased by over 70 percent.
- The amount of R&D performed by the higher education sector remained steady.

(Statistics New Zealand, 2013)

R&D includes a range of activities, which can be grouped under three broad headings:

- **Basic research** searches for new knowledge or technologies to underpin a range of applications, accounts for about 26% of the funding.
- **Applied research** determines possible uses of basic research towards a specific practical aim or objective, accounts for about 41% of the funding
- **Experimental development** uses knowledge gained from research and practical experience to produce new or improved materials, processes, or products. This accounts for about 33% of the funding.

> The predominant type of R&D varies across the sectors – businesses conduct more experimental development, while government and higher education R&D is directed more towards research.

(Statistics New Zealand, 2013)

Manufacturing, primary industries, and health are the top three areas of the economy to which R&D expenditure is targeted.

Almost three quarters of manufacturing-focused R&D was performed by the business sector, $385 million in 2012. Businesses also performed over 80 percent of information and communication services R&D. The government performed the most R&D for primary industries, while most health-related R&D was performed by the higher education sector. (Statistics New Zealand, 2013)

New Zealand's proportion of R&D undertaken by the government sector has traditionally been higher than in other countries, with the proportion undertaken by businesses correspondingly low. Government R&D is driven by Crown research institutes, who are some of the larger R&D performers in New Zealand. These types of organisations and others conduct industry-good research, which would often be covered by the business sector in other countries. (Statistics New Zealand, 2013)

There is about $490 million spent on 'Bioscience' research in New Zealand. Bioscience is the development and application of knowledge of the way plants, animals, and humans function for the development of products and services. The Government is the largest contributor at $200 million, universities are next at $180 million, and businesses are a little over $110 million.

How the research benefits industry comes from 2 main streams. The government and industry funded Primary Growth Partnerships and the Sustainable Farming Fund. These are normally short term research grants. The other stream of funding flows though the research at Crown Research Institutes and Universities.

3 Discussion and Conclusion

The conclusion from this research is that for the Kiwifruit industry is in good hands for heading into the future. There is a good team that is covering the long term research, and that two different companies, Plant and Food, and Zespri are investing in it adds strength and depth to it. The long term strategies appear to be developed and honed in house, with environmental scanning performed outside the groups that are actually involved with guiding the research. The very high level oversight from the key stakeholders is invaluable for garnering information from all over the companies involved, as though their roles they are exposed to a wide range of issues outside the specific research field that adds to their decisions. The Government and outside research fields act as facilitators in this case.

Government is providing a substantial part of the funding and enabling the environment for all this to happen in, but they don't have direct influence in the decisions. The Tertiary research institutes and general research in New Zealand will constantly challenge the allocation of the limited resources available, but it was pleasing to see that it is slowly increasing. The general research they provide is absolutely invaluable as it adds to the depth and experience that can be drawn on whenever an opportunity presents itself. They are also hugely responsible for fostering and honing the researchers that come though and without them we would be nowhere.

This project only really scratched the surface on the overview / governance of the research in New Zealand. Further work could be done on finding more about the product concept group at Plant and Food / Zespri and the motivations that they have. More work could be done on investigating the model that works in the Kiwifruit industry, and seeing if it could be put in place in other industries. (Although there is a certain critical mass, or size, that is in the industry that allows it to work well)

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