

Bringing smart technology to kiwifruit growers

Jayne Chamberlain¹ and John Cook²

¹ Zespri International Ltd, 400 Maunganui Road, Mount Maunganui 3116, New Zealand

² Hay Wood Ltd, PO Box 322, Te Puke 3153, New Zealand.

Email: jayne.chamberlain@zespri.com

Abstract. Mobile computing has fundamentally changed the face of business around the world. The relative recent release of smartphones has been a game changer for many and it is recognised in international extension circles that the future rests heavily in web based mobile technology. In the New Zealand kiwifruit industry the need for rapid and effective learning has increased significantly with the arrival of the *Pseudomonas syringae actinidae* (Psa) epidemic and the associated development of new varieties. There is a risk of information overload in this period and to overcome this there is a strong need to provide timely, up-to-date, relevant information to growers in a user friendly way. The development of electronic mediums and forums provide several advantages to deal with this. This paper outlines the steps Zespri International Ltd. intends to take to build a technologically based extension workstream to compliment and build upon current learning platforms.

Keywords: kiwifruit, mobile, electronic, information, tools, learning

Introduction

Mobile computing has fundamentally changed the face of business around the world. The relative recent release of smartphones has been a game changer for many and it is recognised in international extension circles that the future rests heavily in web based mobile technology (Warden and McIntosh 2012). In New Zealand (NZ) ownership of smartphones continues to rise exponentially. This time last year it was estimated 33% of New Zealanders owned a smartphone but in the last year ownership has predicted to have risen to 60%. And while smartphone ownership has doubled, tablet ownership has nearly tripled - figures showed only 7% of New Zealanders had a tablet device last year, a figure that has now risen to 19% (TNS Survey 2013).

Technology and the New Zealand Kiwifruit industry

This ownership trend translates through to NZ kiwifruit growers. In a recent Zespri email survey of its grower base, findings indicated 54% of growers own a smart phone and 37% had a tablet device. These figures are still to be validated through a representative mail survey. However, this suggests that there is the potential in the NZ kiwifruit industry to create dramatic new opportunities for effective learning to optimise on-orchard decision making to maximise orchard profitability.

In the NZ kiwifruit industry the need for rapid and effective learning has increased significantly with the arrival of the *Pseudomonas syringae actinidae* (Psa) epidemic and the associated fast tracking of commercialising new varieties. The quantity of information and the associated need for synthesis into practical knowledge has grown vastly. The ability to rapidly adopt new orchard management practices has a significant impact on both the size and speed of the industry's recovery and ultimately industry growth. Information is being updated and new knowledge is constantly emerging making it difficult for growers to remain up-to-date with the latest most relevant data for their situation. The development of electronic mediums and forums provide several advantages to deal with this:

- Interactive tools allows for technical information to sit in the background with growers only having to deal with a user friendly front end.
- Data can be stored, sorted and accessed from anywhere, at any time.
- It is how the younger generation naturally want to engage with information and thereby facilitates succession.
- Over time it offers efficiencies as there is less reliance on hard copy information.
- Allows for equal dissemination of information over a widely dispersed (geographically) grower base.

Zespri's Orchard Productivity Centre (OPC) has already successfully developed and introduced a range of online resources/tools for growers ranging from web based learning tools, electronic newsletters and electronic data reporting tools. Specifically these include:

- Horticultural Information Portal: a comprehensive web based resource of pan industry reliant information developed in conjunction with the NZ Sustainable Farming Fund, educational providers and the wine and avocado industries.

- Pollination Module: a web based learning tool to assist industry to improve its pollination practices.
- Spray Tech Box: an interactive resource including information, tools and calculators developed to train the trainers in improving sprayer setup and calibration.
- KiwiTips/Click: a monthly electronic newsletter developed for NZ, Italian and French growers.
- Graftcare: a fortnightly electronic newsletter supporting best practice vine establishment.
- Electronic cropload, fruit size and dry matter monitoring reports and calculators.

The success of these initiatives has provided further confidence that this mode of learning needs to be prioritised and extended for the kiwifruit industry. Success was measured by monitoring traffic to web pages and for electronic newsletters monitoring unique opens and number of hyperlink clicks. Also, with the current market trends it is evident that all new smart tools and/or systems developed need to be compatible with mobile devices as well as the traditional desk-top computer. The fact that using mobile technology is an inevitable next step and component of future learning programmes is elegantly summed up by Wagner (2005 p. 44):

Whether we like it or not, whether we are ready for it or not, mobile learning represents the next step in a long tradition of technology-mediated learning. It will feature new strategies, practices, tools, applications and resources to realize the promise of ubiquitous, pervasive, personal and connected learning. It responds to the on-demand learning interests of connected citizens in an information-centric world. It also connects formal educational experience ... with informal, situated learning experience'

Steps to implementing a technologically based extension workstream

This paper outlines how Zespri's OPC team is intending to implement additional mobile technologies into their extension programme. The key aim is that any tools developed to aid mobile learning is as a supplement to other extension workstreams, e.g. printed communications and/or technical events. In this way, mobile learning will be complimentary to other forms of learning; ensuring a truly multi-faceted approach to disseminating technical information is achieved. It is about 'facilitating, supporting, enhancing and extending the reach of teaching and learning' (Tribal 2011).

Step One: Obtaining 'buy in'

The OPC team's programmes are core to the wider Zespri Grower Engagement Strategy. In the present environment high priority is placed on providing growers with information that drives increases in productivity, particularly in relation to the management of Psa and rapid establishment of new varieties. Zespri OPC has an industry Steering Committee which provides strategic oversight of their extension priorities, key workstreams and objective opinion on the effectiveness of its programmes. This group is made up of Zespri Executive and key industry stakeholders. This committee has encouraged OPC to take a leadership role in bringing to and enticing kiwifruit growers to use 'smart tools' and social media to further accelerate learning and sharing of experiences to optimise orchard management decision making.

As a consequence of this mandate a separate project team has been set up comprising of a number of innovative growers and Zespri management. To provide an identity to Zespri OPC's commitment to this area, a project name has been created (initiated by a leading grower) 'Project BIGTIK' an acronym for 'Bringing Innovative Growers Technology in Kiwifruit'.

At governance level there is buy-in to the idea of using technology more extensively to communicate technical messages and best practice to the kiwifruit industry. The next challenge will be getting kiwifruit growers to buy in to using smart technology, which for some, will be a very different approach to learning and applying knowledge.

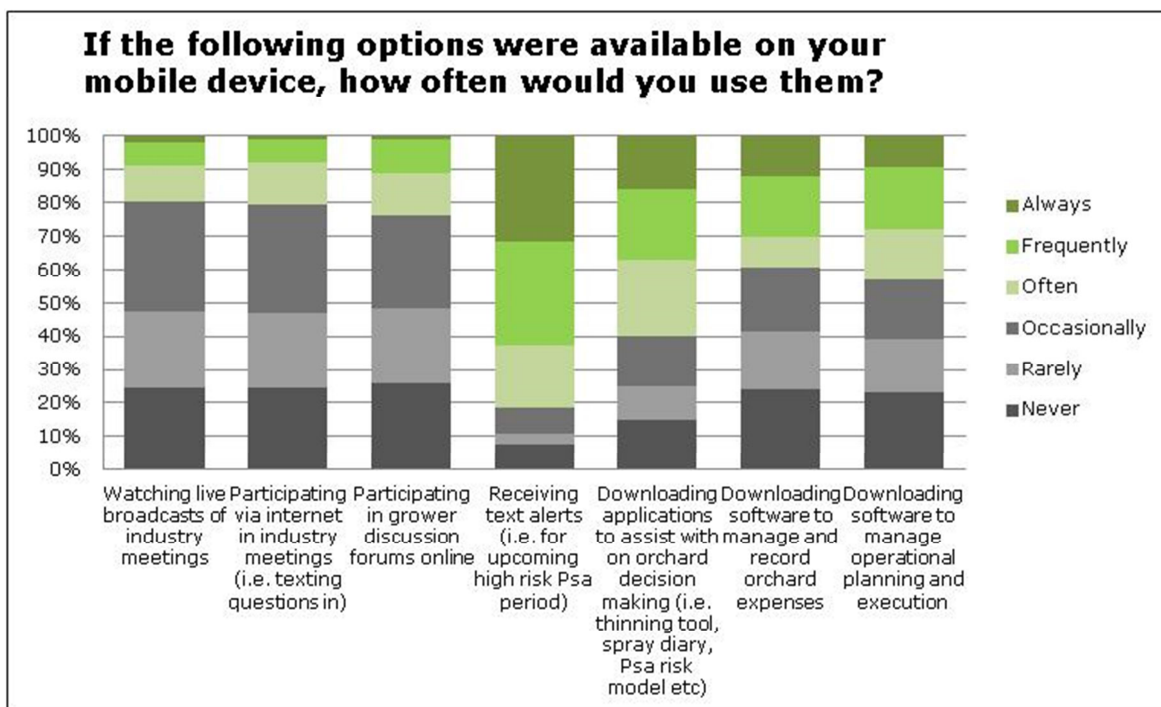
Step Two: Understanding current usage and attitudes to mobile technology

To understand the challenge, Zespri OPC needed to gain a benchmark of where the kiwifruit industry sits in relation to mobile technology/smart systems. By gaining insights on current usage and interest by kiwifruit growers in using mobile technology it also helped to direct initiatives and priorities for Project BIGTIK.

An email survey was sent to all NZ kiwifruit growers in March 2013 who had 'opted in' to email contact on the industry database. Because of this criterion the sample set may have been bias towards using mobile technology. Hence, the results have been viewed as indicative or insightful only with a further truly representative survey planned for later in 2013. As mobile technology is changing so rapidly and uptake is increasing so quickly, the results needed to be interpreted as 'here and now' and a need to 'anticipate' was acknowledged as usage and attitudes towards mobile technology is very much a moving target.

The findings from this survey were that 54% of growers have a smartphone (in line with NZ’s national ownership figure) with 37% owning a tablet (higher than the estimated overall NZ ownership figure of 19%, TNS Survey 2013). What was encouraging is that kiwifruit growers do not appear to be lagging behind in their purchasing of mobile devices. In terms of how these devices could be used in the future to aid with on orchard decisions (refer to Figure 1) there was interest in receiving text alerts around key weather events, in applications (apps) which would assist in orchard decision making (ie: fruit thinning tool, spray diary etc.) and in downloading software to assist with orchard financials and operation planning/execution. In terms of online grower discussion forums to encourage sharing of ideas and innovations or webinars to disseminate science results, there was less interest which means Zespri OPC will currently be ‘leading’ demand when implementing any trials in this area.

Figure 1. Histogram of what tools/software kiwifruit growers would use on their mobile device



Connectivity to broadband was highlighted as an issue as broadband is not currently adequately available in some rural NZ locations. Encouragingly the NZ government has two schemes underway the ‘rural broadband initiative’ which will deliver broadband peak speeds of at least 5 Mbps (megabits per second) to 86 per cent of rural homes and businesses. Before this initiative started, only about one-fifth of rural homes and businesses had broadband of 5 Mbps. The other is the ‘Ultra-Fast Broadband Initiative’ which is a government programme to expand and develop NZ’s broadband services. The plan is by 2020, 75 per cent of New Zealanders will be connected to ultra-fast broadband. Schools, hospitals and 90 per cent of businesses will be connected by 2015. The remaining 10 per cent of businesses will be connected by 2019 (NZ Ministry of Business, Innovation & Employment 2011).

Step Three: Start with ‘quick wins’

To demonstrate progress and value to end users (the growers) but also to those in governance four simple ‘quick win’ tools have been targeted to be piloted in 2013/14 in four different areas. These tools have been prioritised according to potential grower uptake, likelihood of success, speed of execution and that they cater for different learning styles. These tools can then be independently evaluated on their success which will provide direction for further Zespri OPC smart system development. The areas include:

1. Mobile Application – fruit thinning decision tool
2. Automated text alerts – risk periods for Psa infection
3. Social Media – Zespri OPC Facebook page
4. Electronic discussion forum.

Zespri OPC also sees its role as part of Project BIGTIK to generate/heighten interest in using information technology on orchard which will be helped by implementing the tools above but will also be achieved by showcasing growers already taking this approach. Ultimately the goal is that grower demand will encourage commercial entities to start developing tools for kiwifruit growers.

Step Four: Ring-fence resources/investment

Cost and resources can be the limiting factors to how extensively a technologically based extension workstream can be implemented; as it's not just the implementation costs, but also the on-going cost of technical support and upgrades. Whilst it may be considered that mobile learning will be a cost saver, there will be a lag before these savings will be seen.

To ring-fence resources in this area Zespri OPC is working with a wider Zespri team to identify, evaluate and apply to external funding sources to assist. Being able to implement a successful extension programme in the area of mobile technology would be a game changer and timely as experts agree that rapid mobile adoption is still in its early stages (Scoop Media 2013). Hence, for funding bodies there is the attraction of investing in building resource capability to develop new mobile smart systems and ultimately to contribute to the increased financial returns that better on orchard decision making will bring.

Step Five: Evaluate: to direct future developments

The opportunities are endless whether its satellite imagery of kiwifruit orchards for crop estimation, to on orchard photographic recognition of pests and/or damage leading to recommended control strategies, to automated visual assessments of fruit counts and size, to data collection of the disease status of kiwifruit vines linked to a global positioning system.

However, in the end it must be remembered that 'whatever the technology or mode of delivery, learning should be the key objective and pedagogy rather than technology should drive the decision making' (Belshaw 2009).

Conclusion

Mobile applications and systems are becoming a key way in which people receive, send information and utilise decision support tools. Looking at how this technology can enhance and support the uptake of best practice on kiwifruit orchards is essential for the industry to remain relevant and to have a truly multi-faceted approach in disseminating technical information to increase uptake and, hence, financial returns for growers.

Reference

- Belshaw, D 2010, 'Mobile and wireless technologies review', JISC.
- Drill S 2012, 'Mobile applications for extension', *Journal of Extension*, 50(5): 5TOT1, <<http://www.joe.org/joe/2012october/tt1.php>>.
- Tribal 2011, 'Mobile learning network', <<http://www.m-learning.org/case-studies/molenet->>.
- NZ Ministry of Business, Innovation & Employment 2011, 'Ultrafast broadband and rural broadband initiatives', <www.med.govt.nz>.
- Scoop Media 2013, 'Mobile Technology opens opportunities for primary industries' <www.scoop.co.nz>.
- Schofield CP, West T and Taylor E 2011, 'Going mobile in executive education', *Research for UNICON*, <<http://uniconexed.org/en/>>.
- TNS Survey 2013, 'Survey reveals smartphone ownership doubles in 12 months', <www.scoop.co.nz>.
- Warden E and McIntosh G 2012, 'CropMate™ and VarietyChooser: Developing the technology of extension', *Australasia Pacific Extension Network (APEN) ExtensionNet*, 19(3): 7-8.
- Wagner E 2005, 'Enabling mobile learning', *Educause Review*, 40(3): 40-53.