Horticulture Innovation Australia

Final Report

Evaluation of commercially available farm management software programs for the vegetable industry

Belinda Hazell
TQA Australia Inc

Project Number: VG13106

VG13106

This project has been funded by Horticulture Innovation Australia Limited using the vegetable industry levy and funds from the Australian Government.

ISBN 0 7341 3554 8

Published and distributed by:
Horticulture Innovation Australia Limited
Level 8, 1 Chifley Square
Sydney NSW 2000
Tel: (02) 8295 2300
Fax: (02) 8295 2399

Contents

Summary

Australian vegetable growers are adopting new farm management practices and technologies and adjusting the scale, mix and scope of their operations in response to seasonal and market conditions. To be viable for the future, increasing numbers of vegetable growing businesses will be multifaceted, growing more than one crop to spread risk in an ever changing environment. Profitability is vital for sustainability, demanding a higher need for real time information. The impact of recent advances in computer technology on farm management is expanding with the adoption of new technology practices a continuous process which occurs through a number of pathways such as software programs, mobile apps, telematics, agricultural drones, crop sensors, cloud based platforms and even social media. As new technology options emerge, vegetable growers will need to be progressively agile to leverage its potential.

As a result of this project, a list of farm management software programs was compiled which vegetable growers can use to identify the most appropriate tool, from crop management through to social media, to purchase for their business that will meet their farm management needs.

Whilst there are a range of benefits in employing farm management software programs, such as integrated data collection in real time, increased farm performance, a systematic approach to management and improved forecasting ability, a number of barriers are evident.

Limited access to high speed broadband and/or equivalent technologies in regional and remote areas is a significant business constraint. The Australian government must maintain a priority focus to invest and deliver services in key growing areas to enable the sector to be competitive.

Further industry training and case studies for mainstream vegetable growers and agribusinesses is required so that they understand the capabilities of new technology and the best methods of adoption. In particular, vegetable growers should be more aware of how to use social media, including the benefits of using and harnessing it as an innovative method for connecting with consumers and marketing of produce. Due to the lack of scale in regional and remote areas, the Australian government should provide new funding for vegetable growers to access customized and contextualized training to improve technology adoption and facilitate practice change.

Peak industry bodies are a key mechanism to promote awareness and adoption of emerging horticultural technologies that are shaping new production methods and business approaches. As well as industry conferences (such as the annual AusVeg conference) the vegetable industry would benefit by increasing awareness and/or attendance of peak industry representatives and/or growers at emerging technology events such as Mobile Tech.

Government and industry have invested in a number of studies (including this one) to provide vegetable growers with a comprehensive list of programs available for use. Given the speed of technology innovation and new products entering the market, this list needs to have an industry custodian to review and update information so that it remains current and relevant – maintaining its value to industry.

Keywords

Farm management software, matrix, programs, systems, technology, vegetable growers,

Introduction

Farm management is the collective term for various management strategies and methods that are employed to keep a farm productive and profitable. Australian vegetable growers looking for ways to improve skills for farm management have an array of programs available to them ranging from basic paper based guides, targeted training programs, internet resources, computer software programs, mobile applications (or apps) and even social media. The purpose of this project is to investigate the range of farm management software programs available for use by Australian vegetable growers with a view to improving their ability to review and assess these programs for their individual use. For the purposes of this project, farm management software is defined as:

> *A tool that assists in the decision making process to affect business profitability*.

In the future, more vegetable growing businesses will be multifaceted, growing more than one crop. Profitability will remain a priority driver, with a higher need for reliable real time information. As new technology emerges, vegetable growers will need to become increasingly savvy to leverage its potential. Younger people entering the vegetable industry will be better educated with higher computer skills, harnessing technology for operational activities including e-commerce and business-to-business transactions.

For many vegetable growers, the paper shuffling required to manage business activities (such as quality assurance compliance and financial management) is not easy to maintain, with many turning to software programs and mobile technology to facilitate management and upkeep of their business activities and manage the increasing complexity and volume of data. Selecting the appropriate programs for use will depend on the vegetable grower's skills and goals for their business. Choices will be based on the needs of each vegetable grower and must be assessed individually.

Methodology

This project was undertaken by TQA Australia (TQAA) on behalf of Horticulture Innovation Australia Limited (HIA Ltd). The purpose of this project is to investigate the range of farm management software programs available for use with a view to improving the ability of vegetable growers to review and assess these programs for their individual use.

The project has a desktop study as its central activity. The following actions were undertaken:

Vegetable grower interviews

Interviews with vegetable levy payers were conducted in conjunction with the HIA Ltd project *Evaluation of Quality Assurance Programs for the Vegetable industry* (VG 13082). Voluntary engagement in the interview stage was difficult to achieve despite using a variety of media and industry activities to highlight the project objectives. As a result, TQAA networks were heavily relied upon for the interview

stage. Two levels of interviews were conducted, with in-depth face-to-face interviews with 10 vegetable growers and/or packers and shorter phone interviews with 21 vegetable growers and/or packers. The purpose of the interviews was to identify the programs currently being used, including 'off the shelf' models and tailor-made solutions that vegetable growers have developed themselves. TQAA investigated the motivations behind the use of the programs, the reasons particular programs were purchased and used, and the primary and secondary uses of the adopted programs currently on the market.

Desktop study

The aim of the desktop study was to identify the range of farm management software programs currently available to vegetable growers in the Australian context. Previous research was reviewed including the RIRDC Publication No 07/163 *Farm Management Software for Farm Businesses: Case-studies of the Australian farm software industry* and RIRDC Publication No 08/038 *Overview of Farm Mapping Software in Australia.*

To focus the scope of the desktop study, exclusions were applied. These included:

- Software not relevant to vegetable growers;
- Software used by researchers (such as Sense T – which is a shared resource working with partners to develop next-generation sensing technology);
- Crowd sourcing programs (such as openfoodnetwork.org.au, which are designed to act as a collective mechanism for social benefit);
- Programs used for emergency purposes (such as first aid or fire);
- Non-Australian software (some exceptions are noted as examples);
- Software products under development or no longer available.

Farm management software matrix

A list of farm management software programs was compiled from the desktop study which vegetable growers can use to identify the most appropriate tool, from crop management through to social media, to purchase for their business relevant to their farm management needs.

Primary Industries emerging technology conference – Mobile Tech 2014

Project team members attended Mobile Tech 2014 to gather information about emerging horticultural technologies and software programs. A summary of farm management software technologies relevant to this project is included in this report.

Outputs

The following project outputs have been achieved:

Farm Management Software Matrix

A matrix has been compiled listing a range of software programs (including apps) currently available to assist vegetable growers identify which programs may be suited to their business needs.

Vegetable growers' technology adoption and practices

Information garnered from vegetable grower interviews has provided a description of current industry adoption and practices.

Outcomes

The required outcome from the project is to raise awareness and enhance knowledge of farm management software programs so that vegetable industry players have the capacity to make informed decisions in the purchase and/or use of farm management software based on the results of this project.

Results

Growing Trends

Software programs make it possible for vegetable growers to keep track of operational data to simplify a number of management tasks. In addition to this software, state of the art equipment for cultivation, harvesting, and maintenance also help enhance the productivity of farms of all sizes.

The impact of recent advances in computer technology on farm management is expanding with the adoption of new technology practices a continuous process which occurs through a number of pathways such as software programs, mobile apps, telematics, agricultural drones, crop sensors, cloud based platforms and even social media. Conversely, paper-based manuals or record-keeping systems are often readily accessible, less expensive and, for smaller farms that have less information to manage, less expensive to use.

The following figure depicts the interaction of farming management activities:

Figure 1: Operations of Farm Management Software

Source: https://farmmanagementsoftwer.wordpress.com/2014/06/10/farm-managemet-software

Janssen and van Ittersum (2007) [1] research finds that when information is the limiting factor in decision making, transparency and quickness of information flow contribute to improve efficiency of all production chain components, and may result not only in better management but in high quality and safe products as well. Further that when combining the use of technology as information and a follow-up tool, is currently an essential aspect of competitiveness both in internal and external markets. Rolfe et al (2003)[2] argue that farmers are notoriously conservative and cautious with new technology. However, the increasing rates of take up indicate that farmers are gaining real benefits from using information technology, and that they judge the benefits to be greater than time, money and frustration involved in getting to grips with a new technology.

Use of Computers by vegetable growers

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) survey data noted in Table 1[3] finds most vegetable growers used a computer to help run their businesses during 2011-12, the computer / internet was used to help manage their financial affairs (51 per cent) and obtain weather information (46 per cent). Other uses by vegetable growers included accessing market information (24

[1]Janssen, S., & van Ittersum, M.K. (2007). Assessing farm innovations and responses to policies: a review of bio-economic farm models, *Agricultural Systems*, vol. 94, pp 622-636.

[2] Rolfe, J., Gregorb, S., & Menzies, D. (2003). Reasons by farmers in Australia adopt the internet, *Electronic Commerce Research and Applications*, vol. 2, pp 27–41.

[3] Australian vegetable growing farms: an economic survey, 2011-12 and 2012-13 (published 07/02/2014) and Australian vegetable growing farms: an economic survey, 2010-11 and 2011-12 (published 04/12/2012). *Australian Bureau of Agricultural and Resource Economics and Sciences*.

per cent) and industry links (22 per cent). Interestingly, only a small portion of users used computers for education purposes (10 per cent) and media releases (8 per cent). This result suggests a heavy reliance on industry service providers and communication pathways (such as workshops and field days) rather than the use of electronic means to delivery industry information.

Table 1 Use of computers on vegetable farms, by state, 2011–12

Percentage of farms

Computer activity		NSW		Vic.		QLD		SA		WA		Tas.			Aust.	
Financial affairs	%	36	(18)	54	(23)	46	(23)	37	(30)	79	(13)	66	(20)		51	(9)
Market information	%	19	(44)	15	(53)	27	(32)	10	(30)	22	(38)	56	(20)		24	(15)
Weather information	%	23	(27)	33	(31)	53	(18)	29	(38)	73	(12)	83	(11)		46	(8)
Purchasing farm inputs	%	5	(47)	7	(54)	21	(41)	7	(41)	6	(55)	34	(30)		13	(20)
Education	%	4	(57)	7	(53)	5	(44)	11	(41)	5	(71)	43	(26)		10	(17)
Media releases	%	4	(56)	4	(99)	11	(47)	5	(35)	0		26	(33)		8	(23)
Industry links	%	8	(43)	27	(35)	19	(39)	14	(35)	15	(48)	59	(23)		22	(15)
Other	%	40	(22)	7	(65)	21	(36)	57	(19)	12	(69)	0			23	(14)

Note: Figures in parentheses are standard errors expressed as a percentage of the estimate. Percentages do not add to 100 per cent because more than one response was allowed.
Source: ABARES Australian vegetable growing farms survey

Fewer small vegetable growers used a computer or computer-related technology compared to larger vegetable growers (see Table 2). 93 per cent of vegetable growers on farms with vegetable plantings in excess of 70 hectares used computers compared to 40 per cent of vegetable growers on farms with plantings less than 5 hectares. GPS (Global Positioning systems) were used in 44 per cent of crop production with larger vegetable growers compared to zero use by smaller vegetable growers. Table 2 below highlights that for all main uses of technology on farm - there is a major gap between the larger and smaller vegetable growers.

Table 2 Use of technology in vegetable farms, by area of vegetables sown, 2010–11

Percentage of growers

		<5 hectares		5–20 hectares		20–70 hectares		>70 hectares	
Farms using a computer in their business	%	40	(26)	79	(8)	87	(5)	93	(3)
Farms using GPS during crop production	%	0		17	(31)	17	(22)	44	(13)
Use of the internet for									
Education resources	%	9	(32)	6	(49)	18	(26)	23	(28)
Financial affairs	%	25	(39)	41	(17)	51	(12)	71	(7)
Industry links	%	8	(57)	25	(26)	27	(25)	39	(14)
Market information	%	16	(19)	19	(33)	32	(20)	53	(11)
Media releases	%	6	(23)	10	(44)	8	(29)	23	(23)
Weather information	%	16	(60)	46	(12)	51	(11)	68	(9)
Purchasing farm inputs	%	9	(54)	11	(45)	22	(22)	35	(21)
Other	%	6	(53)	3	(70)	8	(64)	1	(72)

Note: Figures in parentheses are standard errors expressed as a percentage of the estimate.
Source: ABARES Australian vegetable growing farms survey.

In 2010-11 the data reveals a wide-ranging awareness of the capabilities of technology to assist in improving management practices and subsequently improve farm productivity. Table 3 highlights that

26 per cent of vegetable growers saw a need to introduce or expand their use of technology. This technology adoption provides industry participants (both large and small) with decision support programs and the opportunity to better manage information, identify performance areas and where improvements can be made, particularly if it is a multi-faceted and multi-site operation.

Table 2 Management practices to improve vegetable farm productivity, by state, 2010–11

Percentage of farms

	NSW		Vic.		Qld		SA		WA		Tas.		Aust.	
	%		%		%		%		%		%		%	
Expand mechanisation	16	(38)	21	(25)	7	(36)	36	(40)	23	(43)	38	(27)	20	(14)
Introduce or expand technology use	21	(35)	27	(24)	23	(39)	26	(45)	23	(40)	50	(22)	26	(14)
Increase scale of operation	11	(53)	6	(38)	5	(55)	15	(63)	36	(37)	26	(34)	13	(19)
Improve financial management	9	(60)	18	(25)	6	(61)	12	(55)	31	(44)	38	(23)	16	(17)
Higher yielding varieties	31	(31)	45	(23)	35	(30)	59	(29)	23	(40)	73	(13)	41	(11)
Introduce genetically modified vegetables	13	(51)	4	(43)	8	(59)	12	(68)	5	(75)	5	(58)	8	(27)
Nothing	48	(18)	21	(46)	36	(28)	24	(73)	32	(36)	14	(59)	32	(14)
Other	13	(46)	7	(65)	11	(52)	1	(103)	13	(48)	7	(96)	10	(26)

Note: Figures in parentheses are standard errors expressed as a percentage of the estimate.
Source: ABARES Australian vegetable growing farms survey.

Agricultural technologies

Technologies used in farming systems are characterized by high complexity and are becoming increasingly sophisticated in managing returns from farm assets. Technology has also improved the method and speed of communication. Peak industry bodies are a key mechanism to promote adoption of technology using proven methods (such as conferences, field days, case studies) to engage growers. Examples of industry conferences and seminars to promote such technology are the AusVeg conference, seminars such as the Global Technologies in Horticulture, and Mobile Tech, which showcases new UAVs (unmanned aerial vehicle - an aircraft piloted by remote control or on-board computers), robotics and automation technologies shaping the future for primary industries. Project team members attended Mobile Tech 2014 to gather information about emerging horticultural technologies and software programs for this project. Key topics included improving communication networks, the use of cloud computing, UAVs, wireless monitoring, enhanced quality satellite imagery and the integration of smart phones into local businesses. Delegates included senior industry managers, technology decision makers, R&D managers, researchers, policy makers and decision makers. It should be noted that the Mobile Tech 2014 conference would have been more relevant had more exhibitors participated (only six exhibitor displays were available). The industry would benefit by increasing awareness and/or attendance of peak industry body representatives and/or growers at such events. In addition, organisers of conferences such as Mobile Tech need to ensure that there is a varied array of exhibitors and information available to make grower attendance worthwhile.

Examples of agricultural technologies used by vegetable growers that require some form of software management include (but not limited to) precision farming, telematics, mobile devices (including tablets), apps, crop sensors, cloud based platforms and social media such as Facebook, YouTube and Twitter. Relevant examples are summarised below:

- Precision farming, using Geographic Information System (GIS) and Global Positioning System (GPS) combined technology, provides analysis of an entire farm down to sub-paddock regions. As noted in Table 2 above, about one-quarter of Australian farmers use precision agriculture technology in their businesses to improve farming practices. GPS-based applications in precision farming are being used for farm planning, field mapping, soil sampling, tractor guidance, crop scouting, variable rate applications, and yield mapping. GPS allows farmers to work during low visibility field conditions such as rain, dust, fog, and darkness. High accuracy guidance systems have been viewed by many as expensive technology suitable only for large-scale operations, with zero use by small vegetable growers. This industry update is verified by a recent HIA Ltd report (2012)[4] which indicates that the horticulture industry has been slower to take up these technologies due to the smaller scale of farms and the enormous variability across growing systems (eg. regions, climatic influences, range of plant physiology – orchards vs plantations vs field crops vs protected cropping, seasonality requirements, etc) - however the industry is now showing strong signs of interest to learn….precision agriculture is considered a relevant and important emerging technology.

- Telematics make it possible for farm equipment to 'talk' to farmers, equipment dealers and other equipment. Most modern farm equipment is today enabled with sensors and monitors that gather operational data as they move across paddocks (such as harvest data, monitor machine performance or troubleshoot problems). Telematics will make it possible for agricultural consultants to troubleshoot problems remotely and offer guidance to resolve technical issues without interrupting fieldwork or making trips to the field[5]. Telematics also has the potential to increase equipment operating efficiencies.

Figure 2: Graphic depicting Telematics

Source: Tractor.EU[6]

[4] Acil Allen Consulting (2013). Precise positioning in the agriculture sector - An estimate of the economic and social benefits of the use of augmented GNSS services in the agricultural sector.

[5] http://www.ag.ndsu.edu/agmachinery/precisionagriculture/telematics-machinery-operating-information-available-on-internet

[6] http://tractor.eu/case-ih-presented-new-telematics-systems-at-field-days-2014-in-france-news291.html

- Mobile device is a handheld tablet or other device that is made for portability, and is therefore both compact and lightweight. New data storage, processing and display technologies have allowed these small devices to do nearly anything that had previously been traditionally done with larger personal computers. Smartphones are now commonly used, which have a high-resolution touch screen display, WiFi connectivity, Web browsing capabilities and able to accept hi-tech applications. The majority of these devices run on any of these popular mobile operating systems: Android, Symbian, iOS, BlackBerry OS and Windows Mobile. A tablet is a wireless, portable personal computer with a touch screen interface. The tablet size is typically smaller than a notebook computer but larger than a smartphone. Rugged tablets are a slate-like model that is designed to withstand rough handling and extreme conditions which make them a viable option for field use. Vegetable growers are increasingly using smartphones and tablets to operate a range of applications to assist in data collection, field documentation and cropping and farm management.

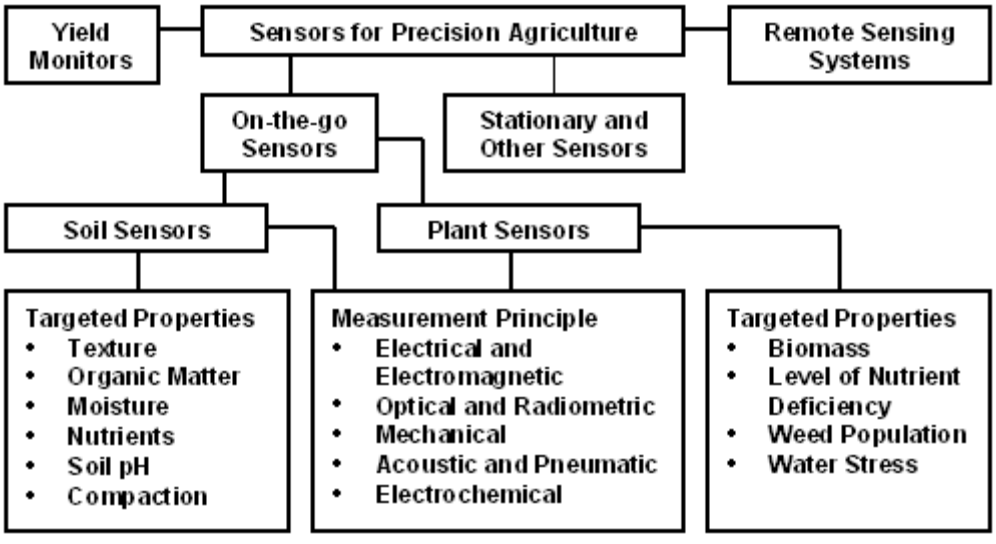
- Apps is an abbreviation for application. An app is a piece of software which can run on the Internet, on a computer, smartphone, tablet or other electronic device. Mobile apps can only be obtained by downloading them from an online app store. Some apps are free, while others must be purchased. Mobile apps are typically much cheaper than desktop applications and are intended to be used on-the-go and are developed to integrate with a small touchscreen interface (such as a tablet). Part of the reason mobile apps are cheaper than desktop applications is because they are often less advanced, have limited functionality and take less resources to develop. Vegetable growers are able use apps as an innovative technology option – for example, to utilise precision irrigation by downloading the relevant app and use it to closely monitor irrigation rates, prevent crop loss and avoid wasting this resource. Some innovative farmers, such as James McShane from "Rotherwood", Tasmania, have developed activities based apps to suit their multi-faceted operation. Farmware is a web application that allows farmers to enter the records of their livestock, crops and storage in the field, offline and simply. Users synchronise their data with the Farmware Cloud so it is safe as well as available to other devices and users within their business. This development option allows growers to tailor apps for their business but requires significant investment both in time and costs, including extensive field testing, promotion for uptake and ongoing training and support should growers wish to venture down the path of commercialisation.

Figure 3: Innovative approaches to precision irrigation

Source: EnviroVeg

- Crop sensors help vegetable growers to produce high performance crops. Crop sensor technology allows users to collect additional information that can be used to measure the success of early season decisions, to measure what is happening during the growing season and support future management activities. For example, crop sensors will help vegetable growers avoid applying more fertilizer than is needed and decrease leaching and runoff into ground water.

Figure 4: On-the-go soil and plant sensors as part of the family of sensors used in precision agriculture[7].



Source: Precision Farming: Challenges and Future Directions, Proceedings of the 4th International Crop Science Congress. Brisbane, Australia, 26 September - 1 October 2004.

- Cloud based platforms allow software vendors to develop software that is independent of the user computer hardware and that can be accessed from multiple device types such as smartphones, tablets, laptop and desktop computers. The cloud based platform allows software to be developed that runs on single (or groups) of remote computers, called servers, that are accessed over the internet by the user. There are two main types of cloud services:

    - Software as a Service (SaaS): This is where the user either uses a web browser or a very simple piece of software installed on their device (called a 'client' program) to use a software application that runs on a computer located remotely (within the internet) rather than on the user's own device. User data is also typically stored on remote servers rather than on their own machine. Software as a Service will often allow the user to switch between different access devices seamlessly as they move from office (e.g. desktop/laptop) to travelling (tablet, smartphone) to on-site operations (smartphone).

[7] Dobemann, A., Blackmore, S., Cook, S.E. & Viacheslav, I.A. (2004). Precision Farming: Challenges and Future Directions, Proceedings of the 4th International Crop Science Congress. Brisbane, Australia, 26 September - 1 October 2004.

- Attached services: This is where the user's own device typically has some software installed that provides functionality in its own right, but when connected to the internet can provide access to additional functionality through software provided on a server. Examples of additional functionality include enhanced or premium services, shared data storage (across many users), real time information updates (e.g. weather data, market data etc.) or real time interaction with other users (information sharing, support groups, social media). Attached services will often allow users to access their data from different devices allowing switching between devices but unlike 'Software as a Service' each device needs to have device specific software installed to provide the local application.

With both service models it is usual for the user data to be stored on the remote server in the 'cloud'. This has the benefit that the data is usually backed up more frequently than it would be if it was only stored on the user device and requires less maintenance activity from the user to manage the process. Cloud based services are usually provided on a subscription basis rather than outright purchase. The end result is a more efficient and less costly way of conducting business.

Web based platforms allow software vendors to develop software that is independent of the user computer hardware that can be accessed from multiple device types (e.g. smartphones, tablets, desktop pc etc.). The web based services provided by such platforms can usually be considered to be 'Software as a Service' solutions as described previously under 'Cloud based platforms', the distinction being more a subtlety of technology rather than services provided to the user. Many companies now offer both desktop and web versions of their most common programs.

- Social media such as Facebook, YouTube, LinkedIn, Tumblr and Twitter. The value of social media lies in the worth of social capital. The two most popular social media programs are Facebook and YouTube. Facebook provides vegetable growers with an easy way to engage, network, share and extend industry knowledge and engage consumers. YouTube allows vegetable growers to upload, view, and share videos to display a wide variety of user-generated and corporate media videos. Increasingly, vegetable growers are turning to social media to provide commentary on relevant industry issues (such as posts about environmental matters or country of origin labelling) and access online training videos (such as new equipment operation). Industry bodies such as AusVeg, can also monitor and harness social media for crisis communication strategies. Twitter is an online service that allows users to share updates with other users. It can be used to blog about news, politics, market trends or any other hot topic. Twitter's appeal lies with its simplicity. It allows users to stay connected through quick updates that only take a limited time to write (each tweet is limited to 140 characters).

Benefits and barriers of adopting farm management software systems

Today's vegetable growers recognise the value of implementing advanced technology (as noted above) to advance profits and decrease input costs. Farm management software systems need to be flexible to monitor performance and to cater for the varying and changing needs of vegetable growers who are suppling markets with increasing expectations. There are significant advantages for vegetable growers once a software program is in place as a regular function of farm management. Benefits include (but not limited to) improved farm performance (such as increased yield and cost savings), a systematic

approach to management, ability to measure and monitor costs, integrated data collection in real time (after initial training on system-specific use), improved capture, accuracy and simplified analysis of information, improved forecasting ability and greater access of information to account and financial advisors – all of which are easily updated and can be automatically calculated in a format for evaluation and comparison. Use of social media programs also provides communication benefits such as engagement and exchange of industry information.

Conversely, there are a range of barriers some vegetable growers may need to address to capture benefits. These include (but not limited to) availability and allocation of resources to purchase suitable software systems including options for system interoperability, the computer skills required to interpret, navigate and work with the software (particularly for complex systems) and flexibility to allocate the necessary time to learn the key aspects of the software system. Privacy and security of information can also be an inhibiter to uptake. Of increasing concern to vegetable growers is the limited access to high speed broadband. Numerous studies have highlighted the poor performance of broadband technologies within Australia particularly in regional and rural areas. Vegetable growers who were interviewed for this project raised the interconnectivity of software and ability to access and/or the speed of internet connections as key business impediments.

Farmers will adopt new technologies only if they offer convenience, simplicity and a clearly demonstrated commercial advantage; and, if early adopters are seen by others in the industry to benefit, then diffusion can be rapid. Llewellyn (2011)[8] found that the complexity of innovations and the demands on management time and attention will increasingly determine peak adoption, not just the time to adoption. Social media also poses communication challenges. Vegetable growers need to learn to trust this tool (e.g. privacy and security) and consider the terms of engagement – for example, if their post about a trending industry issue will have credibility or if it is out of step with mainstream community values.

A significant industry constraint is the low level of computer literacy and/or use. As show in Table 2 *Use of technology in vegetable farms, by area of vegetables sown, 2010–2011* there are low levels of computer use particularly for smaller vegetable operations. This suggests that vegetable growers need to access further training to enhance skills in using computers and/or interpreting data to maximize software use. Training for vegetable growers in regional and remote areas needs to be customized and contextualized for different learning styles (such as face-to-face training) so that vegetable growers are coached through the process of technology adoption. Vegetable growers need to effectively use technology as well as access the technology.

Further industry training and case studies for mainstream vegetable growers and agribusinesses is required so that they understand the capabilities of new technology and the best methods of adoption. In particular, vegetable growers should be more aware of the benefits of harnessing social media as an innovative method for connecting with consumers and marketing of produce. Due to the lack of scale in regional and remote areas, the Australian government should provide funding for vegetable growers in these areas to access customized and contextualized training.

[8] Llewelly, RS (2011) Reducing the cost of complexity for greater farming systems change, CSIRO Ecosystem Sciences.

Sourcing and identifying farm management software systems for the Australian vegetable industry

Grower interviews, a desktop study and review of similar research projects (i.e. RIRDC Publication No 07/163 *Farm Management Software for Farm Businesses: Case-studies of the Australian farm software industry* and RIRDC Publication No 08/083 *Overview of Farm Mapping Software in Australia*) were conducted to identify the range of farm management software programs relevant to Australian vegetable growers.

Grower Interviews

As there was a limited response by vegetable growers to participate in project interviews from promotion in industry newsletters, TQAA utilised its own network to personally contact and coordinate participants. Project interviews were conducted over 10 site visits and 21 telephone interviews with vegetable growers from New South Wales, Queensland, Tasmania and Victoria in combination with the HIA Ltd project *Evaluation of Quality Assurance Programs for the Vegetable industry* VG13082. To ease into the interview process and to gain an overview of operations, the initial phase of the questionnaire included general information about the business, crops and volumes handled. Subsequent questions included discussion about the farm management software programs used, information pathways and purchasing decision triggers.

The survey questionnaire *Evaluation of Farm Management Software for the Vegetable Industry* outlines the specific questions or information required for capture during this phase and is included in Appendix 2. Due to business sensitive information obtained during the interview process, some growers expressed the need for information to remain confidential and, as such, a contact list of vegetable growers interviewed will be provided to HIA Ltd as a separate confidential attachment to this report.

From the range of vegetable growers interviewed, it is apparent that the industry continues to be diverse with many business models in place. Some businesses grow tens of thousands of tonnes of hard vegetables for specific markets with specific management systems and software programs in place. Other businesses grow tens of tonnes of niche vegetables without structured management systems and limited technology programs in place. The information obtained through interview with this range of businesses varies in depth and scope, as the information was reliant on the point in time information recall of the person interviewed.

Vegetable business profiles

The following overview is helpful to understand the businesses reviewed for project purposes. The businesses have been split into three categories based on their scale of production. It should be noted that the project team found that the scale of production also correlated strongly to the uptake of management systems and programs.

Small production volumes (up to 1,000 tonnes)

The key features of this group were:

- 14 vegetable growers produced less than 1,000 tonnes of crop each.
- Apart from one enterprise, all businesses had a single operational system and/or tool in use. The programs utilized were either paper based or required only basic spreadsheet or computing

functions.

- On average, this group produced 2.1 different types of vegetable crops, most producing 1 or 2 vegetable crop types.

Medium production volumes (1,000 to 5,000 tonnes)

The key features of this group were:

- 7 vegetable growers produced between 1,000 and 5,000 tonnes of produce each year, however some of these businesses were producing large volumes of high value leafy and soft vegetables (eg hydroponics), making them quite large in terms of turnover and staffing levels.
- These businesses had on average 2.5 operational systems in place primarily for quality assurance requirements. The programs used by these businesses were either off the shelf specific software packages or custom designed software packages.
- On average, this group produced 3.7 different types of vegetable crops.

Large production volumes (10,000 to 50,000 tonnes)

The key features of this group were:

- 4 vegetable growers reported producing between 10,000 and 50,000 tonnes of produce.
- These businesses had on average 3.75 operational systems in place primarily for quality assurance purposes. The systems and/or programs used by these businesses were either off the shelf specific software packages or custom designed in house software packages.
- On average, this group produced 5.5 different types of vegetable crops.

Summary and discussion of survey feedback

Farm management software systems used for the business operation

The farm management software systems (programs) used by vegetable growers identified in the interviews, ranged in complexity, price and level of customisation. Each tool was adopted with consideration of the purchaser or crop market in mind. Paper-based manuals have been excluded from the project scope. Some of the programs identified in the interviews were:

1. Basic computer system - these systems used spreadsheets, electronic documents, file sharing and basic reporting.
2. Off-the-shelf software and/or apps - examples of this were Agworld, GrowTrak, Livefarmer, PAM (Paddock Action Manager) and Freshtrack.
3. Custom software - this is where a package or suit of products is developed for a specific business.

The following dot points summarise the responses provided:

- Respondents used software programs for document management and control, financial management, quality assurance and programs specifically designed for farming / cropping management and farm mapping.

- The list of software programs or 'programs' used by respondents included Access, Agworld, Canvas Forms, Dropbox, FarmSoft, Farmware, Freshtrack Gateway / FieldOp, GrowTrack, IronBark, Live Farmer, Mango, Microsoft Office suite (Word, Excel), Microsoft Nav, Moodle, MYOB, PAM (Paddock Action Manager), Pronto, Shareplus, Sharepoint, Wiki docs, Wiki intranet, Xero.

- The simpler programs (such as apps, Canvas Forms, Dropbox, Excel, Moodle, Wiki docs and Word) were typically adopted by the smaller businesses, whereas the off-the-shelf software and custom software packages were adopted by large businesses with complex production systems selling into multiple markets. This approach requires extra resources to optimise performance such as IT support.

This diversity of programs used by respondents illustrates that there is not a 'one size fits all' tool adopted. Interestingly, most respondents starting using software systems in the last four years with a large number of respondents still using simple spreadsheets. Some respondents wanted to roll out a range of programs across their business but major impediments were access to high speed broadband and wireless networks.

Information pathways

Vegetable growers have a multitude range of pathways available to identify software programs for their enterprise. However, awareness of these pathways can be limited to a vegetable grower's sphere of influence (large or small). Information discovery pathways were explored to ascertain if there was a common engagement point:

The following dot points summarise the responses provided:

- Accountant told me about the program and how it could be used for my business.

- Spouse was already using the program for their individual business.

- Always used it as the program is part of basic computer use (Microsoft Word / Excel).

- Word of mouth - found out about the program through business and/or industry connections (such as business partner, grower group).

- Had to develop the program to suit specific business needs.

- Identified the program through internet search and/or industry publication (such as farming magazine).

- Recommended by industry service provider (such as agronomist).

It was established that small to medium enterprises found out about software options via industry magazines, on-line searching and/or word of mouth. Larger and more complex enterprises generally

had IT resources available to explain and/or access pathways to address business needs. This result, supported by ABARES data, suggests a heavy reliance on industry communication pathways.

Industry Use

Taking into account industry use, programs such as Canvas forms, Microsoft Office, SharePoint and wiki docs were commonly used across those interviewed.

The following dot points summarise the responses provided:

- Easy and Complex programs for crop data collection and operational decision support and management were used by medium to large operations mainly due to multiply crops grown and number of growing sites. These programs included apps and use of cloud based platforms. Some programs such as Freshtrack Gateway/FieldOp were specifically designed in-house for cropping operations and were used by a large number of growers (respondent indicated up to 50 growers).

- Programs such as Live Farmer could be widely used but are dependent on location and access to services such as high speed broadband and wireless networks.

Vegetable growers are preferring programs that are easy to use due to cost and allocation of time and resources. Language can also be a barrier to uptake and use, driving some growers to maintain paper-based systems. In these instances, on ground training and support is crucial when making the decision to purchase farm management software programs.

Purchasing Decision triggers

In deciding what software programs to purchase and use, respondents identified a range of decision triggers that are common across all primary industry sectors. The following dot points summarise the responses provided:

- 'Ease of use' and 'application across the business' was the main reason for purchase (note: these responses generally reflected those vegetable growers using basic software programs such as Microsoft Office).

- Researched the best available, cost effective tool applicable to my business.

- Talked into it by industry service provider (such as agronomist).

- Looking for something to reduce costs and support business activities.

- Needed a tool that was agile and suited the needs of my business.

- Program links to parent company information requirements.

- Tool had program support and immediate assistance when I need it.

Most respondents used a popular range of hardware depending on the applied need. The hardware programs ranged from Personal Computers (PCs) to portable technology options for data collection such as tablets (i.e. iPad) and the cloud. For some enterprises (generally large and medium sized), a major

factor in deciding which tool to purchase was if the enterprise was linked to a parent company and connectivity between different systems (i.e. two different hardware devices and/or software programs). In these instances, the purchasing decision was based on the needs of the parent company and how information could be captured, transferred and/or integrated for use.

Significantly, some respondents expressed frustration regarding speed and access to broadband. These respondents were aware of programs to enhance their operational effectiveness (such as mobile apps) and strongly believed their businesses were constrained by their inability to leverage from this technology.

Ease of Use

In general vegetable growers want a tool that is easy to use and meets their business needs. They have limited time to navigate around complex programs and/or fully understand the range of program functionality available to them.

The following dot points summarise responses provided:

- Programs such as Canvas forms, Live Farmer, Microsoft Office, SharePoint and wiki docs were commonly used due to ease of use and intuitive to user needs. Respondents didn't need to access technical support and/or had previous experience using the programs (e.g. prior job). Spreadsheets were a common tool used.
- Software programs generally had materials available on line that could be accessed for training purposes (such as YouTube clips or downloadable guides). Apps do not have manuals as the programs frequently get updated and/or changed.
- Apps (such as AgPro, Agworld, Back Paddock Mobile, Farmware) are easy to use and good for vegetable growers who are coming from a paper-based system and want to use new technology. The programs also provide access to live data. However, again concern was raised by some vegetable growers regarding access to services.
- Some programs such as Farmsoft, GrowTrack, PAM, Xero accounting - a number of respondents reported were complicated to set up particularly for someone with lower computer literacy skills and could also be challenging for first time users.
- Respondents were happy with more complex programs once technical support and training had been provided and/or the program had been used for a period.
- Respondents using programs recommended by industry service providers were well supported by the provider with training and/or ongoing technical support.
- In-house developed programs were found to be more complex with respondents taking up to 1 month or more to gain an understanding of the program from start to finish. These programs were not 'pretty' to use like off-the-shelf programs. Technical support mechanisms needed to be established for problem solving software issues which increases the overall cost of the tool.

Primary Use

Small, medium and large vegetable growers reported the following practices in order of primary use:

- Record keeping for compliance.
- Financial reporting (such as cost analysis, forecasting, modelling).
- Crop and/or farm management (such as chemical and fertilizer management).
- Farm maps.
- Uploads and transfers to external parties (such as agronomists).
- Identification and traceability.

These responses are reflected in ABARES data shown in *Table 1: Use of computers on vegetable farms, by state, 2011–12.*

Secondary Use

Small, medium and large vegetable growers reported the following secondary practices:

- Document control.
- Forecasting.
- Training.
- Form development.

As from the summary categories suggest, most respondents indicated that they were seeking ways to reduce overall compliance costs and see farm management software as a key component to achieve this outcome.

Types of Data

Respondents used programs to collect a wide range of data including (but not limited to) the following:

- Cropping data – such as cropping history (planting dates, harvest information), field history (cultivating), crop inputs and weather (rainfall, temperatures, events).
- Global positioning system (GPS) data – such as boundary locations, soil sample locations, digital elevation information.
- Financial data – such as asset inventory, income and expenditure, harvest data, net returns.
- Property data – such as soil type (organic matter, texture, pH, topsoil depth, classification), topography (slope, aspect, position, drainage).
- Yield monitor data – such as volume per area, moisture content.

The following dot points summarise responses provided when considering the amount of time taken to input data:

- For easy to use programs (such as apps, Canvas forms, Microsoft Office, SharePoint and wiki docs) the lowest number of days spend on data input per annum ranged at either 1 day per year or 3 days per year which is a very small labour commitment.
- In the case of small to medium scale business, each had examples of large labour requirements to implement system programs. The high number of days for the 1,000 to 5,000 tonne business was associated with intensive horticulture production and protected cropping systems.
- The larger the business in scale of production, the larger the annual labour component required. This includes the use of QA programs as well as overall farm management software systems.

Data Integration

Small to medium vegetable growers were unsure as to whether data captured could be integrated and/or analysed with other systems. This suggests that some respondents did not have a full understanding of systems capability and supports the barriers to update of limited computer skills required to navigate and work with the software (particularly for complex systems) and flexibility to allocate the necessary time to learn the key aspects of the software system. It may also have an impact in technology adoption with some respondents who could be reluctant to invest much money in farm management software, especially when it may be unclear how the tool can improve the bottom line.

The following dot points summarise responses received:

- Small to medium vegetable growers manually entered data using a range of programs such as paper-based and/or apps. This data was then uploaded, imported and/or transferred via various mechanisms into other business information systems.
- Respondents using financial management programs such as MYOB and Xero manually entered data, transferred and/or uploaded it from other sources such as apps or data loggers. Data could also be uploaded via direct bank feeds.
- Respondents using crop and/or farm management programs manually entered data, transferred and/or uploaded it from other sources such as apps or data loggers.
- Larger vegetable growers had a range of options at their disposal using manual data entry, apps and/or other software programs to capture a range of data to meet business needs. Their system requirements were varied and complex depending on the activity required. System integration costs to create decision support programs were generally higher and captured in overall operational costs, providing the ability to average such costs across a higher volume of product resulting in a lower average cost per tonne than small to medium growers.

Primary benefits

When considering the primary benefits that farm management software programs deliver, the following

responses were provided:

- Programs generate important productivity and yield data that allows the business to improve its operations. This translates to reduced operational costs and allows users to take a more targeted approach to improve operations.
- Time saver – software programs save time and makes life simpler; remove the need for paperwork.
- Improved quality and speed of information – provides real time reporting.
- Decision support tool – allows for tracking of a wide range of data to assist in crop and farm management decisions.
- Apps are better value for money as they are easier to use and much quicker to enter data.

These primary benefits allow vegetable growers to build their capacity to recognise and take advantage of opportunities when they present.

Farm Management Software Matrix

The farm management software program matrix is not an inclusive list and has been developed to feature a range of software programs (including apps) currently available to assist vegetable growers identify the tools best suited to their needs. Using a combined approach a list has been compiled based on:

- Category (crop management, farm management, farm mapping, financial management, quality assurance and social);
- Name of program (if available);
- Whether an app is available;
- Ease of use;
- Description / uses;
- Strategic and/or operational;
- Company name;
- Website address; and
- Cost / directed to website to obtain further information.

Software, app, cloud-based and/or web-based options all require the user to have basic computer skills to gain the most benefit. English is the chosen language but some offer use in other languages. All farm management software programs and/or apps have been designed to solve user problems with a range of technology, language and platforms available. Only a small example of quality assurance software examples have been included in the list as the majority of quality assurance programs have been listed in the HIA Ltd project *Evaluation of Quality Assurance Software for the Vegetable industry (VG 13082)* – See Appendix 3.

The identified programs and/or apps in this project have been rated as 'Easy' or 'Complex' as noted below:

- Easy – programs that are manual, paper-based, off the shelf software, apps and/or can be cloud-based or web-based that offer simple, user friendly functions for a basic system solution.
- Complex – programs that have a range of multifaceted modules that offer comprehensive and integrated solutions. These programs may also have apps that capture data to feed into the main system and can be cloud-based or web-based. They can include custom software, where a package or suite of products is developed for a specific business. These programs may need users to be more 'tech savvy'.

The Farm Management Software Program matrix is included at Appendix 1 of this report.

Regardless of which system is chosen, vegetable growers should ensure that the program/s meet the essential needs of the business.

Evaluation and Discussion

Technology advancements are moving at a fast pace with new programs and/or updates frequently available. Farm management software programs provide vegetable growers with a range of options to improve productivity and profitability. However, as a recurring theme noted in this report, vegetable growers in regional and remote areas can have their businesses constrained by the inability to access equivalent technology as those situated close to major urban areas.

The primary uses of farm management software include record keeping for compliance, financial reporting (such as cost analysis, forecasting, modelling), crop and/or farm management (such as chemical and fertilizer management), farm mapping, uploads and transfers to external parties (such as agronomists, equipment servicers) and identification and traceability.

As margins becoming tighter and market competition increases, effective use of farm management software by vegetable growers will be increasingly essential. Ongoing awareness, education and training are critical. Vegetable growers need to be made aware of the benefits that farm management software programs provide to increase the rate of technology adoption and use. Industry communication pathways such as magazines, case studies, conferences and field days must continue to promote the use of such programs. Peak industry bodies and the Australian government should provide education and training opportunities for vegetable growers to learn about the capabilities of new technology, including social media, to reduce hesitation in use and assist in the change behavior process. Training should be contextualized to the needs of regional and rural areas to effectively facilitate uptake as well as access.

Vegetable growers who participated in the survey process indicated that they would value a list of farm management software programs and wanted to ensure that it was regularly updated. The matrix list is not exhaustive and is current at the time of this project. Given the ongoing transformation and availability of new programs in the technology sector, there should be a matrix custodian to maintain the tool's usefulness.

Recommendations

Our recommendations focus on practical, and achievable suggestions for the vegetable industry as follows:

Government investment in enabling technologies (such as high speed broadband or equivalent)

Limited access to high speed broadband and/or equivalent technologies in regional and remote areas is a significant business constraint. The Australian government must maintain a priority focus to invest and deliver services in key growing areas to enable the sector to be competitive.

Training and extension

Further industry training and case studies for mainstream vegetable growers and agribusinesses is required so that they understand the capabilities of new technology and the best methods of adoption. In particular, vegetable growers should be more aware of how to use social media, including the benefits of using and harnessing it as an innovative method for connecting with consumers and marketing of produce. Due to the lack of scale in regional and remote areas, the Australian government should provide new funding for vegetable growers to access customized and contextualized training to improve technology adoption and facilitate practice change.

Awareness and adoption of emerging horticultural technologies

Peak industry bodies are a key mechanism to promote awareness and adoption of emerging horticultural technologies that are shaping new production methods and business approaches. As well as industry conferences and seminars (such as the annual AusVeg conference) the vegetable industry would benefit by increasing awareness and/or attendance of peak industry representatives and/or growers at emerging technology events such as Mobile Tech.

In addition, organisers of conferences such as Mobile Tech need to ensure that there is a varied array of exhibitors and information available to make vegetable industry participant attendance worthwhile.

Matrix Custodian

Government and industry have invested in a number of studies (including this one) to provide growers with a comprehensive list of programs available for use. Given the speed of technology innovation and new products entering the market, this list needs to have an industry custodian to review and update information so that it remains current and relevant – maintaining its value to industry.

Scientific Refereed Publications

None to report.

IP/Commercialisation

None to report.

References

1. Janssen, S., & van Ittersum, M.K. (2007). Assessing farm innovations and responses to policies: a review of bio-economic farm models, *Agricultural Systems*, vol. 94, pp 622-636.

2. Rolfe, J., Gregorb, S., & Menzies, D. (2003). Reasons by farmers in Australia adopt the internet, *Electronic Commerce Research and Applications*, vol. 2, pp 27–41.

3. Australian vegetable growing farms: an economic survey, 2011-12 and 2012-13 (published 07/02/2014) and Australian vegetable growing farms: an economic survey, 2010-11 and 2011-12 (published 04/12/2012), *Australian Bureau of Agricultural and Resource Economics and Sciences*.

4. Acil Allen Consulting 2013, Precise positioning in the agriculture sector - An estimate of the economic and social benefits of the use of augmented GNSS services in the agricultural sector.

5. http://www.ag.ndsu.edu/agmachinery/precisionagriculture/telematics-machinery-operating-information-available-on-internet, accessed 27/03/2015.

6. http://tractor.eu/case-ih-presented-new-telematics-systems-at-field-days-2014-in-france-news291.html, accessed 27/03/2015.

7. Dobemann, A., Blackmore, S., Cook, S.E. & Viacheslav, I.A. (2004). Precision Farming: Challenges and Future Directions, Proceedings of the 4th International Crop Science Congress. Brisbane, Australia, 26 September - 1 October 2004.

8. Llewellyn, RS. (2011). Reducing the cost of complexity for greater farming systems change, *CSIRO Ecosystem Sciences*.

Acknowledgements

TQA Australia Ltd (TQAA) acknowledges the essential contribution made by the following people and organisations:

Industry:

Our sincere thank you is extended to the interview and survey participants who contributed their valuable time and thoughtful contributions to this project.

AusVeg

James McShane – Farmware

MacTavish West

Funding bodies:

This project has been co-funded by HIA Ltd using the vegetable levy and matched funds from the Australian Government.

Appendices

Appendix 1: Farm Management Software Program Matrix

Appendix 2: Farm software programs survey questionnaire

Appendix 3: Confidential Attachment (Vegetable Growers Contact List)

Appendix 4: *Evaluation of Quality Assurance Programs for the Vegetable industry* (VG 13082) - List of QA Programs

Appendix 1: Farm Management Software Program Matrix

Category	Program (Tool)	APP Option	Easy	Complex	Description / Uses	Strategic / Operational	Company	Website	Cost / See Website
Crop Management	Ag PhD Fertiliser Removal	x	x		Plan fertiliser applications on crops	Operational	IFA Productions Inc	http://www.agphd.com	Free
Crop Management	Ag PhD Field Guide	x	x		Identify problem pests out in the field	Operational	IFA Productions Inc	http://www.agphd.com	Free
Crop Management	AgDNA	x	x		Farm planning, mapping, equipment tracking and record keeping	Operational	AgDNA	http://www.agdna.com	Free
Crop Management	AgET		x		Simple water balance calculator to understand how plants, soils etc influence the water balance	Operational	Department of Agriculture and Food	http://www.sustainableagriculture.perthregionnrm.com	Website
Crop Management	Agro Lite	x	x		Used by agronomists to create and email paddock/field inspection reports	Operational	EZI App	http://www.eziapp.com.au/index.php/agro-app	Free
Crop Management	APVMA	x	x		Databases of Australian registered agvet products including minor-use and off-label permits	Operational	Australian Pesticides & Veterinary Medicines Authority	https://itunes.apple.com/au/app/apvma/id564121943?mt=8	Website
Crop Management	BASF Weed ID	x	x		Easy to use reference guide based on Encyclopaedia of Arable Weeds	Operational	BASF	http://www.agricentre@basf.com	Free
Crop Management	Bayer Crop Science Product Mar	x	x		up to date label and safety data sheets for herbicide, insecticide, fungicide and seed products	Operational	Bayer	http://www.bayercropscience.com.au/cs/programs/	Free
Crop Management	BeeConnected	x	x		Receive beehive position notifications	Operational	CropLife Australia	http://www.croplife.org.au/industry-stewardship/ppi/beeconnected/	Website
Crop Management	Centre Pivot Calculator		x		Calculates the rate at which water can be supplied to the irrigated area	Operational	CRC: Irrigation Futures	http://www.depi.vic.gov.au/agriculture-and-food/farm-management/soil-and-water/irrigation/centre-pivot-system-capacity	Website
Crop Management	Connected Farm Irrigate	x	x		Monitor and manage irrigation systems	Operational	Trimble Navigation Ltd	http://www.connecrted.farm.com	Free
Crop Management	Crop Diseases	x	x		Access to current disease resistance ratings and image library	Operational	DPI Victoria	http://www.depi.vic.gov.au	Free
Crop Management	Crop Nutrient Deficiencies	x	x		Helps growers determine fertility issues	Operational	IFA Productions Inc	http://www.agphd.com	Free
Crop Management	Cultivapp	x	x		Crop management	Operational	Inventia Agrarica SL	http://www.cultivapp.com	Website
Crop Management	Dam Volume Calculator		x		Tool to calculate how much water is in your dam	Operational	Department of Agriculture and Food	http://www.depi.vic.gov.au/agriculture-and-food/farm-management/soil-and-water/water/farm-water-solutions/how-much-water-is-available/how-much-water-is-in-my-dam	Website
Crop Management	Elders Weather	x	x		Weather forecasts and maps	Operational	Elders	http://www.eldersweather.com.au	Free
Crop Management	EvoCrop Lite	x	x		Record information for financial analysis of crop performance	Operational	Rustic Evolutions	http://www.evocrop.com	Free
Crop Management	Farm Trac Mate		x		Records data in field on supply usage, equipment hours, field and weather conditions, notes, or yield	Operational	Farm Works	http://www.farmingit.com.au/farmtracmate.php	Website
Crop Management	FarmConnect	x	x		Monitor crops and manage irrigation	Operational	Rubicon Water	http://www.rubiconwater.com	Website
Crop Management	FarmNavigator		x		A range of products including a precision farming tool from sowing to spraying to harvest	Operational	Farmscan Ag	http://www.farmscanag.com/farmnavigator/	Website
Crop Management	FarmView				Crop production, planning and management information system	Operational	LandView	http://www.landview.com	Website
Crop Management	Farmware	x	x		Crop management app including paddock usage, records, treatment, inventories and performance	Operational	Farmware	http://www.farmware.net	Website
Crop Management	FertMatch	x	x		Helps with fertiliser calculations	Operational	Haifa Group	http://www.haifa-group.com	Website
Crop Management	Field Peas - The Ute Guide	x	x		Best Management Practices for pest and disease managmement;	Operational	Grains Research & Development	http://www.grdc.com.au/Resources/Apps	Free
Crop Management	FloraMatch	x	x		Helps predict availability of nutrients throughout the season	Operational	Haifa Group	http://www.haifa-group.com	Free
Crop Management	FreshTrack Systems			x	Freshtrack FieldOp assists with forecasting and can be used to compare data, crop yields and prices and to determine gross margins.	Operational	Hortilink Pty Ltd	http://www.freshtrack.com.au	Website
Crop Management	F-Track Live	x	x		Notebook for recording activities on farm	Operaitonal	FarmApps	http://www.farmapps.com.au/	Free
Crop Management	Growtrack		x		Provides worksheets to track changes in growing conditions to maximise yields over the entire crop cyc	Operational	GrowPlans	http://www.growplans.com	Website

Crop Management	HARDI nozzles	x	x		Select the right nozzle	Operational	Hardi	http://www.hardi.com.au	Website
Crop Management	Horticulture Arkive			x	Maintains all records over successive seasons	Operational	Arkive Software	http://www.arkive.com.au/ha1.htm	Website
Crop Management	HortiMaX Productive	x	x		Provide growers with tools to maximise their yields and profitability	Operational	HortiMax	http://www.hortimax.com	Website
Crop Management	HowWet		x		Provides a simple and accurate method of determining soil moisture and nitrogen mineralisation	Operational	APSIM	http://www.apsim.info	Website
Crop Management	HydraWise	x			Adjusts watering schedule to suit local weather conditions	Operational	Hydrawise	http://www.hydrawise.com	Free
Crop Management	ICS-NPK	x	x		Develops a fertilisation plan, and has access to soil tests	Operational	NextGenerationTeam	https://itunes.apple.com/us/app/ics-npk/id47	Website
Crop Management	Inoculant Calculator	x	x		Inoculant calculator	Operational	Becker Underwood	http://www.farmingwithapps.com/2013/03/27/becker-underwood-inoculant-calculator/	Free
Crop Management	Insect ID - the Ute Guide	x	x		Best Management Practices for pest and disease managmement;	Operational	Grains Research & Develo	http://www.grdc.com.au/Resources/Apps	Free
Crop Management	iPlanta Calculator	x	x		Includes a data logger, calculator and GPS Mapping function	Operational	Michael Bausher	http://download.cnet.com/iPlanta/3000-2041	Website
Crop Management	IPM Tool Kit	x	x		Quick access to research, news articles and information	Operational	University of Wisconsin	http://www.farms.com/agriculture-apps/pest/ipm-toolkit-app	Free
Crop Management	IronBark (Fresh Produce)			x	Provides an integrated software solution for fresh produce	Operational	Ironbark Software	http://www.ironbark.com.au	Website
Crop Management	MSDS.com	x	x		Provides growers with an easy way to access safety data sheets and chemical storage information	Operational	MSDS.COM.AU Pty Ltd	http://www.msds.com.au	Website
Crop Management	Muddyboots			x	Tool to effectively manage production and quality	Operational	Muddyboots Software Ltd	http://en.muddyboots.com	Website
Crop Management	MySci Pubs	x	x		Info about agronomy, crop and soil sciences	Operational	Bravura Technologies	http://www.bravuratechnologies.com	Free
Crop Management	MyTraps	x	x		Provides information to apply pesticides efficiently while providing graphical data on your use	Operational	Spensa Technologies Inc	https://mytraps.com/	Free
Crop Management	NPK Fertiliser Cost Calculator	x	x		Estimates the value of Nitrogen per unit of Phosphorus source based on your entered cost per bulk.	Operational	JWS Group	https://play.google.com/store/apps/details?id=com.kineticthoughts.agbizapps&hl=en	Website
Crop Management	OZ Radar Weather	x	x		Australian weather and radar information	Operational	Secure Hub Pty Ltd	https://itunes.apple.com/au/app/oz-radar-weather/id348599879?mt=8	Website
Crop Management	OZE Updates Crop Management		x		Crop management notes and information for growers	Operational	Range Media	http://ozeupdates.com.au/ProIndex.aspx	Website
Crop Management	PAM PDP Module			x	Precision Data Processor ("PDP") is a tool for complete precision agriculture data processing and links to PAM products	Operational	Fairport	http://www.fairport.com.au	Website
Crop Management	PIRI: Pesticide Impact Rating		x		Pesticide risk indicator for water quality.	Operational	CSIRO	http://www.csiro.au/Organisation-Structure/Flagships/Water-for-a-Healthy-Country-Flagship/Ecosystems-and-Contaminants/PIRI-software.aspx	Website
Crop Management	Plant Diagnostic Sample	x	x		Allows farmers and agricultural specialists to submit digital photo samples to a university plant diagnos	Operational	Incubed	http://www.in3applications.com	Website
Crop Management	Pocket Weather AU	x	x		Weather forecasts and maps	Operational	Shifty Jelly Pty Ltd	http://www.shiftyjelly.com/ios/pocketweatherau	Website
Crop Management	Probe for Windows		x		Calculate the amount of water the crop is using, and determine when irrigators are required	Operational	Research Services New England	http://rsne.com.au/prwin/index.htm	Website
Crop Management	Production Wise	x		x	Web based paddock record keeping system	Operational	Production Wise	http://www.productionwise.com.au	Website
Crop Management	RAGT Calculator	x	x		Seed rate calculator for all crops	Operational	RAGT Seeds Ltd	http://iphoneapk.m5f.net/apk/com.seedrate	Website
Crop Management	RainRadarAU	x	x		Displays a sequence of real time radar images with direction and intensity of rain sourced from the Bureau of Meteorology.	Operational	ZethosOrg	http://www.rainradarau.zethos.org	Website
Crop Management	SA Weed Control	x	x		Provides essential information about the control of weeds declared in South Australia	Operational	Biosecurity SA	http://www.pir.sa.gov.au	Free
Crop Management	ScoutDoc Record Keeping App	x	x		Create or import a field map and use to track information for crops for farmers and agronomists	Operational	Ag Excellence Alliance	http://agex.org.au/farming-applications/scou	Free
Crop Management	Seedmaster Seed Rate Calculato	x	x		Seed rate calculator, also calculates total cost	Operational	Objectified Software Inc	https://itunes.apple.com/us/app/seedmaster	Free
Crop Management	Spray App	x	x		Streamline information from the Paddock/field back to the office	Operational	EZI App	http://www.eziapp.com.au/index.php/spray-app	Free
Crop Management	Sprinkler Times	x	x		Allows subscribers to access their custome schedule	Operational	Del Contes Landscaping	http://www.sprinklertimes.com	Website
Crop Management	Store Mainfest	x	x		Provides growers with tools to build a chemical manifest and access chemical storage information	Operational	MSDS.COM.AU Pty Ltd	http://www.msds.com.au	Website
Crop Management	Syngenta TankCalc	x	x		Calculation of filling plans for spraying	Operational	Syngenta	https://play.google.com/store/apps/details?id=com.syngenta.android&hl=en	Website
Crop Management	Tank Mix Calculator	x	x		Builds precision tank mixed for your fields	Operational	Farm Logic	http://www.farmlogic.com/farmlogic_products/tank-mix-calculator/	Free
Crop Management	Tankmix	x	x		Calculates how much product and water needed for effective applications based on your acreage or spray tank size	Operational	Dupont	http://www.dupont.com/	Website
Crop Management	TankMixIT	x	x		Plan spray programs	Operational	Yara International ASA	http://www.yara.com	Free
Crop Management	The Weather Channel	x	x		Location specific weather information and interactive maps	Operational	The Weather Channel	https://play.google.com/store/apps/details?i	Website
Crop Management	Vector Sprays	x	x		Provides droplet size data for the specified operational setup to evaluate a number of sprayers	Operational	AAT	http://www.ars.usda.gov	Free

Crop Management	Victoria DPI Crop Disease	x	x		Crop disease management	Operational	Victoria DPI	http://www.depi.vic.gov.au/agriculture-and-food/grains-and-other-crops/crop-diseases-application-for-smartphones	Free
Crop Management	Water Storage	x	x		Access to information on more than 250+ publically owned water storages across Australia	Operational	Bureau of Meteorology	http://www.bom.gov.au	Free
Crop Management	WaterTrack Rapid / WaterTrack Divider / WaterTrack Optimiser			x	Tools to measure and monitor in-field irrigation performance	Operational	WaterTrack	http://www.watertrack.com.au	Website
Crop Management	Weatherzone Plus	x	x		Weather forecasts and maps	Operational	The Weather Company	http://apps.weatherzone.com.au/	Website
Crop Management	Weed ID - the Ute Guide	x	x		Weed identification	Operational	Grains Research & Develo	http://www.grdc.com.au/Resources/Apps	Free
Crop Management	WeedSmart	x	x		Guage herbicide resistance and weed seed bank risk	Operational	Weedsmart	http://www.weedsmart.org.au/app/	Free
Crop Management	WinCrop			x	Crop records for Windows	Operational	LandView	http://www.landview.com	Website
Crop Management	Yara CheckIT	x	x		Gives growers a photographic library of crops to allow a simple and fast identification of possible nutrie	Operational	Yara International ASA	http://www.yara.com	Free
Farm Management	Agbiz		x		Contains over 250 downloadable economic and financial tools	Strategic / Operational	Federal Government	http://wwwdaff.qld.gov.au	Website
Farm Management	AgGPS 170 (field computer)		x		Facilitates any agricultural operation: spraying, planting, land levelling etc.	Operational	BMS LaserSat	http://www.bmslasersat.com.au/default.html	Website
Farm Management	AgGPS AutoPilot		x		Automated steering system which reduces overlap and driver fatigue.	Operational	BMS LaserSat	http://www.bmslasersat.com.au/default.html	Website
Farm Management	AgGPS EZ-Steer		x		Steering assist system upgrade can be fitted to any vehicle with power-steering that is fitted with the EZ	Operational	BMS LaserSat	http://www.bmslasersat.com.au/default.html	Website
Farm Management	AgGPS TrimFlight3			x	Precision aerial guidance to increase productivity and efficiency by using Global Positioning System (GPS)-based guidance for aerial applications, mapping and recordkeeping	Operational	BMS LaserSat	http://www.bmslasersat.com.au/default.html	Website
Farm Management	AgLeader			x	Decision support tools for data management through to crop, harvest and application management	Strategic	SMS Software	http://www.agleader.com	Website
Farm Management	AGMAPS - Land Manager		x		Support tool that gives instant access to detailed information about the land and its potential uses	Operational	Department of Agriculture and Food	http://archive.agric.wa.gov.au/PC_92575.html?s=1001	Website
Farm Management	AgPro	x	x		Enables the user to track via time, date and location - activities, inputs, staff, work shedules, services delivered by contractors, pests, nutrient levels, symptoms, quality parameters, harvest quantity and quality.	Operational	Hortus Technical Services	http://hortus.net.au/products-software.php	Website
Farm Management	Agworld	x		x	Integrated tool offering farm maps, plans, cash flow, financials, product and disease information, infield data collection	Operational	Agworld	http://www.agworld.com.au/	Free
Farm Management	AirData Vector Analysis		x		Assists to resolve the difficulty of accurate measurement of wind speed and direction	Operational	Environdata	http://www.environdata.com.au	Website
Farm Management	Apex		x		Works with data and applications from John Deere GreenStar system	Operational	Deere & Company	http://www.deere.com	Website
Farm Management	APSIM			x	Simulates biophysical processes in farming systems	Operational	CISRO / Primary Industries Queensland / DAFF	http://www.apsim.info	Website
Farm Management	Australian CliMate	x	x		Offers a range of climate analysis tools	Operational	Federal Government	http://www.australianclimate.net.au/	Free
Farm Management	AutoSPRAY 4080		x		System that will connect with virtually any GPS reciever	Operational	Rinex Technology	https://www.virtualwrench.com/leica-web/app/content/public/mojortk/products/content1375253698415.html	Website
Farm Management	Back Paddock Advisor			x	Software for professional advisors for farm planning, recording and reporting - for multiple users	Strategic / Operational	Back Paddock Company	http://www.backpaddock.com.au/	Website
Farm Management	Back Paddock Manager			x	Software for farm planning, recording and reporting - single user access	Strategic / Operational	Back Paddock Company	http://www.backpaddock.com.au/	Websie
Farm Management	Back Paddock Mobile	x	x		Mobile version of Back Paddock SoilMate and Adviser tools	Operational	Back Paddock Company	http://www.backpaddock.com.au/	Free
Farm Management	Back Paddock Reader			x	Allows a client of a company using Back Paddock to read reports	Operational	Back Paddock Company	http://www.backpaddock.com.au/	Website
Farm Management	Back Paddock SoilMate	x	x		Soil and fertiliser decision support for nutritional advice	Operational	Back Paddock Company	http://www.backpaddock.com.au/	Free
Farm Management	BioBank Tree Calculator		x		Tool for estimating per cent foliage cover is sparse and survey data is not practical	Operational	NSW Government	www.environment.nsw.gov.au/resources	Website
Farm Management	CalcMadeEasy Free	x	x		Scientific calculator	Operational		http://calcmadeeasy.com	Free
Farm Management	Chemical Data Safety Sheets	x	x		Database of SDS's that requires no internet access	Operational	ThatsMyStapler Inc	https://itunes.apple.com/au/app/chemical-safety-data-sheets/id405208132?mt=8	Free
Farm Management	Climate Calculator		x		Online calculator can be used to estimate most annual direct and indirect greenhouse gas emissions.	Strategic / Operational	Carbon Neutral	http://carbonneutral.com.au/carbon-calculator/	Website
Farm Management	Climate Kelpie		x		Tools and information to help manage risk	Strategic / Operational	Federal Government	http://www.climatekelpie.com.au/	Website

Farm Management	Connected Farm Fleet	x	x		Monitor and manage fleet	Operational	Trimble Navigation Ltd	http://www.connected.com	Free
Farm Management	Converter Plus	x	x		Coverts units including volume, area, distance and many others	Operational	TranCreative Software	http://www.trancreative.com	Free
Farm Management	DamEaSy		x		Couples biophysical and economic modeling tools that enables analysis of investing in on-farm water s	Strategic	Irrigation Futures	http://www.irrigationfutures.org.au	Website
Farm Management	Draining Tile Calculator	x	x		Helps determine your tile supply and capabilities for field drainage	Operational	IFA Productions Inc	http://www.agphd.com	Free
Farm Management	Drought Plan		x		Tools and guidelines to assist with drought management	Strategic / Operational	Department of Primary Industries & Fisheries QLD	http://www.dpi.nsw.gov.au/agriculture/emergency/drought/planning	Website
Farm Management	eFarmer	x	x		Mapping, crop planning, field tasks and record keeping	Operational	eFarmer	http://www.efarmer.com	Website
Farm Management	eFarmer Pilot	x	x		Field guidance for farm machinery operators	Operational	eFarmer	http://www.efarmpilot.com	Website
Farm Management	Emergency AUS	x	x		Provides warning and incident information issued by official agencies across Australia	Operational	Gridstone Pty Ltd	http://www.gridstone.com.au	Free
Farm Management	EnviroVeg	x	x		Access to EnviroVeg Plantinum scheme forms to assist with record keeping	Operational	AusVeg	http://www.enviroveg.com/	Website
Farm Management	Evernote	x	x		Syncs notes, lists, photos etc between multiple devices - saves duplication	Operational	Evernote Corp	https://www.evernote.com/	Free
Farm Management	Export-It Plus			x	Software that assists producers and exporters to connect with AQIS EXDOC system	Operational	Syscob	http://www.syscob.com.au/index.php/products-overview	Website
Farm Management	Farm Contractor	x	x		Allows easy management of on-farm contractors	Operational	Stringybark Software	http://www. Stringybarksoftware.com	Website
Farm Management	Farm Manager	x	x		Record cropping and machinery procedures	Operational	Stringybark Software	http://stringybarksoftware.com/	Website
Farm Management	Farm Minder	x	x		Develop operational plans, assit with compliance and pesticide application records	Operational	Farm Minder	http://www.farmminder.com.au/	Free
Farm Management	Farm Safety Induction	x	x		Workplace health and safety tool	Operational	Farm Safe Australia	http://www.farmsafe.org.au/news/new-free-farm-safety-induction-app	Free
Farm Management	Farmbook		x		Decision support tool to plan and cost farm development projects	Strategic	Practical Systems Ltd	http://www.psystems.com.au	Website
Farm Management	FarmMap and Farmbook			x	Farm and crop management solutions	Operational	Practical Systems Ltd	http://www.psystems.com.au/farmmap-1012	Website
Farm Management	FarmPAD	x			Enter farm records, equipment service logs, spray records, mapping info	Operational	Farm Logic	http://www.farmlogic.com/farmlogic_products	Website
Farm Management	Farmsoft			x	Concentrates on traceability, cost mentoring and control, budgeting, reporting / KPL analysis and resource and employee accountability.	Strategic / Operational	Tenacious Systems	http://www.farmsoft.com	Website
Farm Management	Farmstar & FarmstartLite			x	Precision farming add-on to PAM QA	Operational	Fairport Farm Software	http://www.fairport.com.au/en/	Website
Farm Management	Farmstyle		x		Small Farm Advice	Operational	FarmStyle Australia	http://farmstyle.com.au	Website
Farm Management	FloodReadyQ	x	x		Provides actual and flood extent mapping information for Queensland	Operational	HydroLogic	http://www.hydrologic.com	Website
Farm Management	Fruit and Vegetable Packing System		x		Easy to use recording of packout data which integrates with GrowData's Vegetable Management Program	Operational	GrowData Developments	http://www.growdata.com.au/index.php?option=com_content&view=article&id=38&Itemid=10	Website
Farm Management	F-Track Live	x	x		Records Stock, Crops, Tasks and links in multiple interfaces	Operational	Farm Apps Pty Ltd	http://www.farmapps.com.au/	Website
Farm Management	G-Mwater	x	x		Access Goulburn-Murray Water storage levels and on-line water ordering	Operational	Goulburn-Murray Rural W	http://www.g-mwater.com.au	Free
Farm Management	GroGraph			x	Software used to run a water sensor machine	Operational	WISA Irrigation Solutions	http://www.irrigatewisa.com.au/	Website
Farm Management	Harvest Time and Expense Track	x	x		Track time and expenses, and manage invoices	Operational	Harvest	https://itunes.apple.com/au/app/harvest-tim	Free
Farm Management	HR3 Payroll			x	Payroll solutions ideal for larger organisations	Operational	HR3 Payroll	http://www.hr3.com.au	Website
Farm Management	iCropTrack	x	x		Manage field data and reporting	Operational	Cogent3D Inc	http://www.icroptrak.com	Free
Farm Management	Infoveg database		x		R&D search engine containing reports, tools and fact sheets for growers	Strategic / Operational	AusVeg	http://www.ausveg.com.au	Website
Farm Management	Irrigation toolkits		x		A range of tools included soil water samplers, smart water meters, drip performance calculators and irrigation scheduling systems	Operational	Irrigation Futures	http://irrigationfutures.org.au	Website
Farm Management	IrrMAX		x		Generate data on soil water and salinity	Operational	Sentek	http://www.sentek.com.au	Website
Farm Management	JDLink	x	x		Monitor and manage fleet	Operational	John Deere	https://myjohndeere.deere.com/wps/portal/myjd	Free
Farm Management	Long Paddock		x		Database offering high-quality climate related decision support information	Strategic		http://www.qld.gov.au	Website
Farm Management	Mango			x	Workplace health and safety tool	Operational	Mangolive	http://www.mangolive.com/	Website
Farm Management	MesoMap Live			x	Provides users with a way of displaying weather data on a map	Operational	Weather-Display	http://www.weather-display.com	Website
Farm Management	MetAccess		x		Allows users to rapidly extract information from long term daily weather records	Operational	Horizon Agriculture Pty Lt	http://www.hzn.com.au	Website
Farm Management	Microster Workforce Management			x	Supports effective workforce management	Operatonal	Microster Pty Ltd	http://microster.com.au/	Website

Farm Management	M-Log		x		Graph soil moisture and weather data	Operational	Research Services New E	http://www.rsne.com.au	Website
Farm Management	Multi Measures 2	x	x		All-in-one measuring toolkit	Operational	SkyPaw	s/	Free
Farm Management	Multi-Log		x		Graphs data from a wide range of data loggers from different points	Operational	Research Services New E	http://www.rsne.com.au/	Website
Farm Management	myAgri			x	Marries analytical requirements of senior management generating controlling, quality, planning and maintenance information	Strategic	Vistex, Inc	http://www.myagri.com	Website
Farm Management	NemaSYS		x		Multimedia package with information on nematodes in QLD	Operational	BASF	http://www.nemasysinfo.com/	Website
Farm Management	Nine Lives Risk Manager			x	A tool designed to help protect assets and manage risk costs	Operational	Nine Lives Solutions	http://www.ninelives.com.au	Website
Farm Management	N2N Global			x	Customised softare solutions from crop forecasting to farm management and applicability through the supply chain	Operational	N2N Global Link	http://www.n2nglobal.com	Website
Farm Management	Observant GlobalLink	x	x		Users can control and manage the entire system remotely through any internet-enabled device (inc smartphone) from scheduling and turning engines on/off to controllint laterals or pivots.	Operational	Observant Pty Ltd	http://www.observant.com.au	Website
Farm Management	OVERSched		x		Interactive tool to provide a visualisation of soil water deficits and irrigation scheduling options	Operational	Irrigation Futures	http://www.irrigationfutures.org.au/overscheed/overschedv1-0.html	Website
Farm Management	Oz Weather Plus	x	x		Essential Australian weather information	Operational	Ajnaware Pty Ltd	http://www.ozpda.com	Website
Farm Management	P2P Agri			x	Improve business decision-making by modelling and assessing potential future management scenarios	Strategic	P2PAgri Pty Ltd	http://wwwplan2profitagri.com.au	Website
Farm Management	PAM			x	Integrated tool offering financial tools, production recording system, farm mapping, gross margin analysis and performance measurement	Strategic / Operational	Fairport Software System	http://www.fairport.com.au	Website
Farm Management	Pocket PAM	x	x		Mobile app that Integrates directly with the PAM system on farm	Operational	Fairport	http://www.fairport.com.au	Free
Farm Management	ProducePak			x	Software program to assist in operational expances and improve reporting for vegetable production including pack houses	Strategic / Operational	ProducePak solutions Ltd	http://www.producepakindia.com/content/farm_production_management.htm	Website
Farm Management	Pronto			x	Business management software including supply chain management	Operational	Pronto Software	http://www.pronto.net	Website
Farm Management	Rabobank Food & Agri Research	x	x		Access Rabobank's research and insights	Strategic	Rabobank	http://www.rabobanknederland.com	Free
Farm Management	Soil Quality Calculators		x		Various calculators to assist with biological, chemical and physical attributes on farm	Operational	Soil Quality Pty Ltd	http://www.soilquality.org.au/calculators	Website
Farm Management	Swagman		x		Assess farm water supply options	Strategic	CSIRO	http://www.colyirr.com.au	Website
Farm Management	Tractorpal	x	x		Plant and Equipment maintenance tool	Operational	TractorPal	http://www.tractorpal.com	Website
Farm Management	uManage by Netafim	x	x	x	End to end decision support system for crop management	Operational	Netafim	http://www.netafim.com/product-category/umanage	Website
Farm Management	Woody Weed Specialists	x	x		To assist in making decisions to control woody weeds	Operational	Dow AgriSciences Austral	http://www.woodyweedspecialists.com.au/	Free
Farm Management	SST	x	x		Decision support tool, precision farming	Operational	SST Software	http://www.sstsoftware.com	Free
Farm Mapping	ACLUM		x		Australian Collaborative Land Use Mapping program - contains information about land use	Operational	Federal Government	http://www.agriculture.gov.au/abares/aclump/land-use/land-use-mapping	Website
Farm Mapping	AgGPS EZ-Map			x	Mapping, logging, and sampling software for growers and agribusinesses	Operational	BMS LaserSat	http://www.bmslasersat.com.au/default.html	Website
Farm Mapping	AGMAPS - Land Profiler		x		Support tool that gives instant access to detailed information about the land and its potential uses	Operational	Ag Maps Online	http://www/agmapsonline.com.au	Website
Farm Mapping	AGRIplot	x	x		Plot an area on a map	Operational	Sharpe Tech	http://www.sharpetech.net	Website
Farm Mapping	ArcGIS			x	Creates and maintains property maps	Operational	ESRI	http://www.esri.com	Website
Farm Mapping	Area Finder Pro	x	x		Calculates the area of a piece of land using longitude and latitude	Operational	CHS Systems	http://chssystems.com/CHSSystems/Area_Finder_Pro.html	Website
Farm Mapping	AusFarm			x	Flexible simulation tool designed to analyse complex management questions	Strategic	Horizon Agriculture Pty Lt	http://www.hzn.com.au	Website
Farm Mapping	Connected Farm	x	x		Use GPS for field mapping and scouting applications	Operational	Trimble Navigation Ltd	http://www.connecrted.farm.com	Free
Farm Mapping	CropTrak Mobile	x	x		Farm mapping, sampling and field data tool	Operational		http://www.icroptrak.com	Free
Farm Mapping	eFarmer mobi	x	x		Precision agriculture solutions for small to medium farms	Operational	eFarmer	http://www.efarmer.com	Website
Farm Mapping	ER Mapper Professional				Easy to use image preparation, analysis and compression tool	Operational	ER Mapper	http://www.erdas-er-mapper.software.informer.com	Website
Farm Mapping	Farm Keeper	x	x		Map your entire farm accurately, record and analyse paddock performance, fertiliser application and st	Operational	Farm Keeper	http://www.farmkeeper.com/main.cfm	Website
Farm Mapping	Farm Works View		x		View precision farming data	Operational	Trimble Navigation Ltd	http://www.trimble.com	Website
Farm Mapping	FieldWare Tools			x	Store, report and manage information gathered from Mid-Tech guidance products	Operational	TeeJet Australasia Pty Ltd	http://www.teejet.com/english/home/products/precision-farming-products/mapping-software/fieldware%E2%84%A2-suite-301-software.aspx	Website

Farm Mapping	Free Map Tools		x		This planimeter tool can be used to measure the enclosed area of a defined polyline on a map.	Operational	Free Map Tools	http://www.freemaptools.com/area-calculator.htm	Website
Farm Mapping	Google Earth		x		Useful tool for multiple mapping	Operational	Google Inc	http://www.google.com/earth	Website
Farm Mapping	Google Maps		x		Create basic maps and route planning	Operational	Google Inc	http://www.google.com/earth	Website
Farm Mapping	gpMapper			x	Creates a property map, calculates land areas and measures distances for fencelines or pipelines	Operational	Fairport	http://www.fairport.com.au	Website
Farm Mapping	iFarm Crops			x	Complete farm mapping and recording package for crop and livestock enterprises	Operational	eAgribusiness	http://www.eagri.com.au	Website
Farm Mapping	LandView DSS Pro			x	Precision farming decision support linked to crop production	Operational	LandView	http://www.landview.com	Website
Farm Mapping	MyFarm			x	Mapping tool aimed at assisting Tasmanian farmers with farm planning and management	Operational	DPIPWE Tasmania	http://www.farmpoint.tas.gov.au	Website
Farm Mapping	PASource			x	Creates and edits property maps	Operational	PASource	http://www.pasource.com	Website
Farm Mapping	Phoenix Mapping			x	Creates and edits property maps, develop property plans and record keeping	Operational	AGData	http://www.agdata.com.au	Website
Farm Mapping	Planimeter	x	x		Measures distances and lans areas on maps	Operational	Core Signals	https://itunes.apple.com/au/app/planimeter-measure-land-area/id423492040?mt=8	Website
Farm Mapping	ScoutDoc	x	x		Assist to accurately map and document the conditions of your property.	Operational	ScoutDoc	http://www.scoutdoc.com	Website
Farm Mapping	SoilMapp	x	x		Information about soil types and soil properties	Operational	CSIRO	http://www.csiro.au/Organisation-Structure/Flagships/Sustainable-Agriculture-Flagship/SoilMapp-for-iPad.aspx	Free
Farm Mapping	WALI			x	Broad range of applications from local government planning and protection of important areas for agriculture, to inform investors of an area's suitability for particular agricultural land uses	Strategic / Operational	DAF Queensland	http://www.daf.qld.gov.au	Website
Financial Management	AgData (Cropping)			x	Complete financial management system designed and developed specifically for horticulture and business operations. Offers App solutions.	Strategic / Ope	AGDATA Australia	http://www.agdata.com.au	Website
Financial Management	Agrimaster			x	Accounting and cashbook program including budgeting and stock control	Operational	AgriMaster	http://www.agrimaster.com.au	Website
Financial Management	Agrimaster			x	Agribusiness accounting and budgeting software	Operational	AgriMaster	http://www.agrimaster.com.au	Website
Financial Management	Agrivi	x	x		Agribusiness accounting and budgeting software	Operational		http://www.agrivi.com/	Website
Financial Management	Business Support Tools		x		A range of primary production tools from risk calculators, business plan assistance to valution models	Strategic / Operational	Holmes Sackett & Associates	http://www.hs-a.com.au	Website
Financial Management	CashBAS		x		Easy to use Excel spreadsheet linked to your BAS.	Operational	Optimal Business Solutions	http://www.obsolutions.com.au/cashbas.htm	Website
Financial Management	Cashbook Plus			x	Farm accounting software		Practical Systems Ltd	http://www.psystems.com.au	Website
Financial Management	CASHmanager Rural			x	Easy to use cashbook, wage book and debtors with many farming specific features	Strategic / Operational	CRS Software	http://www.crssoftware.co.nz/	Website
Financial Management	Costing an Irrigation system		x		Use this calculator to do a quick check on the annual $ returns from operating an irrigation system	Strategic / Operational	NSW Primary Industries	http://www.dpi.nsw.gov.au/agriculture/resources/water/irrigation/costs/cost-calculator	Website
Financial Management	e-PayDay			x	Automated computerised payroll system with flexible modules	Operational	Logisoft	http://www.e-payday.com/	Website
Financial Management	e-Record		x		A free, electronic record keeping product	Operational	Australian Tax Office	https://www.ato.gov.au/individuals/lodging-your-tax-return/lodge-online/e-tax/downloading-and-installing-e-tax/	Website
Financial Management	Farm Accounts			x	Accural accounting system	Operational	Farmplan	http://www.farmplan.com.au/	Website
Financial Management	Farm Forms - Crops			x	Crop gross margin spreadsheet templates including cashbook and crops	Operational	DPI New South Wales	http://www.dpi.nsw.gov.au/agriculture/farm-business/budgets/templates	Website
Financial Management	Farm Gross Margins Guide		x		Helps farmers and advisers compare the gross margins of enterprises, paddocks and rotations and their respective sensitivity to changes in production, cost and price	Strategic / Operational	Rural Solutions SA	http://www.ruralsolutions.sa.gov.au/	Website
Financial Management	Grow by ANZ	x	x		Banking and investment app to help with banking, super and share investments	Operational	ANZ Banking Group	http://www.wealth.anz.com	Website
Financial management	Harvest Time & Expense Tracker	x	x		Assists to track costs	Operational	Hyperakt	https://www.getharvest.com/	Website
Financial Management	iAgri			x	Farm management and financial budgeting	Operational	Dominion Software	http://www.iagri.com	Website
Financial Management	Income Tax Calculator	x	x		Includes the latest tax rates and other income tax information	Operational	Advanced Draw Tech Ltd	http://www.advancedrawtech.com	Website
Financial Management	MYOB			x	A range of accounting products to suit large and small businesses	Strategic / Operational	MYOB Australia	http://myob.com.au/	Website
Financial Management	NAB	x	x		Access banking tools	Operational	National Australia Bank	http://www.nab.com.au	Website
Financial Management	NetBank	x	x		Access banking tools	Operational	Commonwealth Bank	http://www.commbank.com.au	Website
Financial Management	PCP Agri			x	Tool to help farmers improve their business management	Operational	P2PAgri Pty Ltd	http://www.p2pagri.com.au	Website

Financial Management	Stock Charts	x	x		Provides the latest Australian Securities Exchange informaiton	Strategic / Operational	ChartMobi	http://www.chartmobi.com	Website
Financial Management	Westpac	x	x		Access banking tools	Operational	Westpac Banking Corpora	http://www.westpac.com.au	Website
Financial Management	Xero	x	x		Business accounting, invoicing, reporting, payroll and budgeting software	Operational	Xero	https://www.xero.com/au/change/?gclid=CNi	Website
Quality Assurance	Access			x	A database management sysfem and can be integrated with other technologies such as Excel, Outlook,	Operational	Microsoft	http://www.microsoft.com	Website
Quality Assurance	Canvas Forms	x	x		Tool to convert those mountains of paperwork into easy-to-use mobile apps	Operational	Canvas Solutions Inc	http://www.gocanvas.com/content/try-canvas1/	Website
Quality Assurance	Compliance Checkpoint	x	x		An online tool to assist with audits and reporting	Operational	Compliance Experts	http://www.complianceexperts.com	Free
Quality Assurance	DropBox	x	x		Dropbox keeps your files safe, synced, and easy to share	Operational	Dropbox	http://www.dropbox.com	Website
Quality Assurance	Formatta		x		Creates customised forms which can be distributed electronically	Operatoinal	Access Enterprise Forms	http://www.formatta.com	Website
Quality Assurance	Gorriladox		x		Program to manage documents and tasks	Operational	GFSC Group	http://www.gfscgroup.com/document-management/	Website
Quality Assurance	Harvest Tracemaster			x	Packhouse software including barcode scanning systems and batch label printing systems	Operational	Harvest Tracemaster Australia	http://www.etracemaster.com/	Website
Quality Assurance	iAuditor2	x	x		Create custom audit reports and checklists	Compliance	Safety Culture	http://www.safetyculture.io/iauditor/	Website
Quality Assurance	Icon Global Link - PDS			x	Tool for electronically managing HACCP and other risk management plans	Operational	Icon Global Link	http://www.iglink.com.au	Website
Quality Assurance	LiveFarmer	x	x		Assist with quality assurance management to record farm activites remotely.	Compliance	LiveFarmer	https://www.livefarmer.com/lfsite/	Free
Quality Assurance	myEMS			x	Web based computer application that will facilitate the creation, management and implementation of a compliant ISO 14001 system	Operational	myEMS	http://www.myems.com.au/	Website
Quality Assurance	Pest Genie	x	x		Provides a range of compliance tools for chemical use and storage	Compliance	Pest Genie	http://www.pestgenie.com.au/	Free
Quality Assurance	Quality e-book		x		Provides an introduction on the concepts of establishing your own quality management system	Compliance	Qudos Management	http://www.qudos-software.com	Website
Quality Assurance	Shareplus	x	x		Sharepoint experience for mobile phones	Operational	Microsoft	http//www.office.microsoft.com	Website
Quality Assurance	Sharepoint		x		Secure place to store, organize, share, and access information from almost any device.	Operational	Microsoft	http://www.office.microsoft.com	Website
Quality Assurance	TraceTracker		x		Offers a wide range of product traceability, asset tracking and business intelligence products and solutions to address critical business needs.	Operational	TraceTracker Innovation ASA	http://www.tracetracker.com	Website
Quality Assurance	TracMap Horticulture		x		Easily create and allocate jobs to vehicles from anywhere wirelessly, monitor vehicles in the field in real time, and capture harvest yields and spray records	Operational	TracMap	http://www.tracmap.com	Website
Quality Assurance	Wikidocs		x		Offers realtime collaborative editing of documents	Operational	Atlassian	http://www.wikidocs.com	Website
Social	ABC app	x	x		Provides independent content including latest regional and rural updates	Operational	ABC	http://www.net.au	Free
Social	Agri Marketing Mobile	x	x		Features daily news for agribusiness professionals	Operational	iNet Solutions Group	http://www.inetsgi.com	Free
Social	Aussie Farmers Direct		x		Providing a portal to sell produce direct to consumers	Operational	Aussie Farmers Direct	http://www.shop.aussiefarmers.com.au	Website
Social	DTN The Progressive Farmer	x	x		Browses news, blogs, market commentary and weather information, including interactive charts	Operational	Telvent DTN	https://itunes.apple.com/au/app/dtn-progres	Free
Social	Facebook	x	x		Facebook is a social utility that connects people with friends and others who work, study and live around them	Operational	Facebook	http://www.facebook.com	Free
Social	Inventory & Load Out			x	Provides functions to record, track and report on product inventory	Operational	Cedar Creek Co	http://www.cedarcc.com	Website
Social	Moodle			x	Open source learning platform	Operational	Moodle	http://www.moodle.org	Website
Social	Twitter	x	x		Twitter is an online social networking service	Operational	Twitter	http://www.twitter.com	Free
Social	YouTube	x	x		Hosts user-generated videos. Includes network and professional content. Material can be used for training purposes.	Operational	YouTube	http://www.youtube.com	Free

Appendix 2: Farm software programs survey questionnaire

HAL Projects: Evaluation of commercially Available Farm Management Software Programs for the Vegetable Industry

INTRODUCTION

The following survey is being conducted by TQA Australia which have been funded by Horticulture Australia Limited (HAL), to better understand farm management software programs specific for the needs of the vegetable industry.

The major outcome of the project is to provide vegetable growers with the capability to individually evaluate computer software programs available for their use.

Participants in the survey will go into a draw to win an iPad Mini. The winner will be contacted by TQA Australia after 26 November 2014.

Survey Section: Evaluation of Farm Management Software

Begin Data Capture for Evaluation

Data required

The following table outlines the specific questions or data required for capture in the grower interviews.

Data Capture – Information required	
General Farm Management Software use:	
What software programs do you use for the farm / business?	*List products*
How did you find the software (discovery)?	*Find out most used pathways for information*

What operating platforms does it require?	*Computer software package; Mobile app; cloud based platform; drone; other?*
What made you decide to use this software?	*Application across business; cost?*
When did you start using the software?	*Provide narrative*
Does anyone else in the industry use it?	*Provide narrative, if possible obtain contacts for TQA to follow up*
Is it easy to use?	*Provide narrative*
How hard was it to learn to use?	*Provide narrative (i.e. was a user manual provided; any technical support; on-line examples)*
Specific Software Details	
What is their major application?	*Describe the main tasks they are used for eg financial, mapping; ID & Trace; QA compliance; chemical & fertiliser management*
What else can you use the program for?	*Describe the minor tasks they can be used for (if any)*
What is your favourite programme and why?	*Find out if there is any standout software*
How long does it take to input data?	
Can different data and information be integrated?	*Find out if information and data from different programs be used in the one system*
Can data and information be analysed?	*Provide narrative (looking to ascertain if the program has an analysis function or just captures data)*
What are the key inputs (how is data obtained)?	*Manually entered; transferred from other sources; uploaded (i.e. data loggers) or generated from customised data*
What are the key outputs?	*List examples: Creates reports; lists; maps; benchmarks; product analysis; forecasting; monitoring; models; decision support; record keeping for compliance; uploads / transfers info to consultants and/or*

	external users
What technical support is provided / required?	*Provide narrative*
Are upgrades required?	*Provide narrative*
Describe any constraints to the use of the farm management software?	*List constraints eg access to broadband; limited training; complexity*
Focussing on just farm management software, what improvements have you noted since using the software?	*Does it make things on the farm: easier / simpler; quicker; cheaper; improved quality*
Survey Wrap-up	
In general is there any other comments you wish to add regarding these two projects?	*Provide narrative*

Thank You

Thank you for your participation. The compiled results of this survey and more detailed interviews will be collated into two reports for Horticulture Australia Limited.

If you have any questions about the survey or the two projects, please do not hesitate to contact Belinda Hazell of TQA Australia on 0419 102 476 or Belinda.hazell@tqaaustralia.com.au.

Appendix 3: Confidential Attachment (Vegetable Growers Contact List)

Appendix 4: Evaluation of Quality Assurance Programs for the Vegetable industry (VG 13082)

Table 1: QA Programs and ease of use

QA Tool Name	Company	Website	Easy	Complex	Paper-Based	Software Package / Customised	App / Cloud or Web Based Platform
ABC Software	ABC Software Ltd	http://www.abcsoftware.co.nz		x		x	
Agtrix	Agtrix Pty Ltd	http://www.agtrix.com		x		x	x
Agworld (farm management app)	AgWorld Pty Ltd	http://www.agworld.com.au/	x				x
Canvas Forms	Canvas Solutions Inc	http://www.gocanvas.com	x				x
CMO Compliance (app)	CMO Compliance	http://www.cmo-compliance.com		x		x	x
CompliantPro	Siemens	http://www.ibs-us.com		x		x	
Dropbox	Dropbox	http://www.dropbox.com	x				x
Farm Minder	AgTech Pty Ltd	http://www.farmminder.com.au	x				x
Food Safety Manager	N2N Global	http://www.n2nglobal.com		x		x	x
FoodLogiQ (Labels/ItemTrace)	FoodLogiQ	http://www.foodlogiq.com	x				x
Formatta	Access Enterprise Forms	http://www.formatta.com	x				x
Freshcare	Freshcare Limited	http://www.freshcare.com.au			x		
FreshTemp	FreshTemp	http://www.freshtemp.com	x				x
FreshTrack Systems	Freshtrack Systems	http://www.freshtrack.com.au		x		x	x
Google Docs	Google	http://www.google.com	x				x
Gorriladox	GFSC Group	http://www.gfscgroup.com	x				x
GrowData (orchard / vineyard / packing)	GrowData Developments	http://www.growdata.com.au		x		x	
HarvestMark	YottaMark	http://www.harvestmark.com	x				x
Hastings Data Loggers	HDL Pty Ltd	http://www.hdl.com.au	x			x	
HACCP Manager Software	South Coast Business Solutions	http://www.haccpmanagersoftware.com		x			x

HACCP Now	HACCP Now	http://www.haccpnow.com		x		x	x
I Auditor	Safety Culture	http://www.safetyculture.com.au					x
Icon Global Link	Integrated Standards Enf. Systems	http://www.iglink.com.au		x		x	x
Icicle	Burton Software	http://www.icicle.burtonsoftware.com		x			x
Intelex (QSQA)	Intelex Technologies Inc	http://www.intelex.com/		x		x	
IronBark (Fresh Produce)	Ironbark Software Pty Ltd	http://www.ironbark.com.au/		x		x	x
ISO Tracker	LennoxHill	http://www.isotracker.com		x			x
Lean & Mean Business Systems	Lean Machine Business Systems Inc	http://www.theleanmachine.com		x		x	
Lettus Software (Supplier focus)	Fresh Computer Systems Pty Ltd	http://www.freshcomp.com.au		x			x
Live Farmer	Marpak Pty Ltd	http://www.livefarmer.com/		x			x
Mango	Mango Ltd	http://www.mangolive.com/		x			x
MasterControl	Mastercontrol Global Ltd	http://www.mastercontrol.com/		x		x	x
MetricStream	Metricstream Inc	http://www.metricstream.com		x		x	x
Muddyboots	Muddy Boots Software Ltd	http://en.muddyboots.com/		x		x	x
PackTrack (also offer PackMaster & Pick2Market which are more complex)	GV Custom Software	http://www.gvcustomsoftware.com.au	x			x	x
PAM Ultracrop	Fairport Farm Software	http://www.fairport.com.au		x		x	x
Paradigm3	Paradigm Software Pty Ltd	http://www.paradigm3.com.au/		x		x	x
Phoenix Cropping	Agdata Australia	http://www.agdata.com.au		x		x	x
Quality Systems Toolbox	Maus	http://www.maus.com.au/product/quality-assurance-software/		x			x
Safe Food 360	Safe Food 360	http://www.safefood360.com/		x		x	x
SafetyChain (for food)	SafetyChain Software Inc	http://www.safetychain.com/		x		x	x
Sharepoint	Microsoft	http://www.office.microsoft.com/	x				x
Smart-Trace Online Monitor	Ceebron Pty Ltd	http://www.smartrace.com	x				x
TraceTracker	TraceTracker Innovation ASA	http://www.tracetracker.com	x				x
TracMap Horticulture		http://www.tracmap.com	x				x
TruQC	TruQC LLC	http://www.truqcapp.com	x				x

Unipoint	Unipoint Software Inc	http://www.unipointsoftware.com		x			x
Verify Traceability (eQTrace)	Verify Traceability	http://www.verifytraceability.com		x		x	x
ZenDoc	ZenDoc	http://www.getzendoc.com/	x				x