

COGGO

Council of Grain Grower Organisations Limited
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Final Report

COGGO Research Fund for 2014 projects

A project completion report covering the project. The acceptance of a satisfactory report against the objectives of the project, and agreement on the sharing of any commercial returns and/or IP will trigger payment within 4 weeks, by COGGO for any outstanding payments.

This Final Report should be completed with reference to the Research and Intellectual Property Agreement (the Research Agreement) signed between the proponent and COGGO Pty Ltd.

1. Project information

Project title	Upskilling the Western Australian grains industry in disease surveillance for a more productive and biosecure future.
Commencement Date	01 January 2014
Completion Date	07 February 2017

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Project Number	
Date Received	

2. Project results	This section provides a final report against the Project Aim and the Planned Outputs for the Project.
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Achievement of the Project Aim	Brief statement of achievement in relation to the aim of the project
	<p>The Australian grains industry relies on growers and agronomists being able to identify and manage endemic diseases in their crops and being aware of the possible threat of high priority pests (HPPs) becoming established in their crops. However, there is insufficient evidence to judge whether growers and agronomists within the industry have the skills and capacity to meet this expectation. I undertook a training needs analysis to determine the ability of growers and agronomists to identify endemic diseases and to recognise the top four HPPs threats in their crops. A benchmark of 70% for growers and 80% for agronomists was set: this corresponds to 70% of growers being able to identify endemic diseases in their crops and 80% of agronomists being able to identify the endemic diseases in crops. This is the first time a benchmark for pest and disease knowledge has been determined in the Australian grains industry. Both growers and agronomists met the benchmarks for identification of endemic diseases in crops. However, their knowledge of the top four HPPs was well below this benchmark. Thus, it would appear that providing information through knowledge transfer is insufficient to increase the knowledge of growers and agronomists and enable them to alert industry to a possible incursion of an HPP. Therefore, surveys were conducted to examine growers' and agronomists' preferences regarding the types and sources of information they preferred to use. The types of general information used were community-, training- or technical-based. To solve specific pest and disease problems, growers either used an agronomist or sourced publicly available information. Agronomists' preferences were based on content and whether the information had a general, regional or a local focus.</p> <p>A survey was conducted with growers and agronomists within the grains industry to determine what types of training activities they liked to attend, why they liked to attend them, and what barriers prevented them from attending. Occupation, gender, location and education influenced the number of field days attended. Participants found field days to be informative, interactive, and visual and an important opportunity to network with other farmers, colleagues and professional research officers. Agronomists preferred to attend formal workshops on agronomy and crop production issues such as herbicide application, pests and diseases. Workshops were valued because they were informative, interactive and local. Growers liked belonging to grower groups because they were local, interactive and informative and supported networking. Participants' age and location influenced their membership of grower groups.</p> <p>Field days and workshops were evaluated to determine if knowledge levels increased after they had been attended. Participants' knowledge levels increased after the events but demographic variables such as occupation and education level influenced knowledge levels before the event.</p> <p>Because it is difficult for many participants from rural communities to attend training events, the use of information technology communication tools to provide timely information was evaluated by testing the use of webinars, YouTube videos, and podcasts during two growing seasons in Western Australia. Outcomes varied depending on the event evaluated and the participants involved. Agronomists preferred using the webinars and YouTube videos as the information was provided in a timely manner allowing management strategies to be implemented. Podcasts were developed during the second season following feedback from growers.</p> <p>This research demonstrated that it is important to provide information and learning opportunities to rural communities, growers and agronomists in different formats. Effective training requires that there is time for participants to reflect, and interact at training events, and that post-event</p>

information is provided in different formats. Short webinars, and YouTube videos can be used to provide succinct and pertinent information to growers and agronomists.

The theoretical framework developed indicates that significant interactions occur between growers and agronomists, and how and where they seek information and attending training. The use of information communication tools can facilitate the interaction between information and training as well as the grower and agronomists. Further research is required to fully understand these interactions and how to optimize the information developed so that it can be incorporated into an informal or non-formal training activity.

Project Outputs		Please provide a report on the achievement, or otherwise, of the project outputs as per the planned outputs provided in the Project Proposal.
1	-	<p>Output 1 (from Project proposal)</p> <p>A report on training needs analysis of growers and agronomists in relation to plant diseases and biosecurity</p>
		<p>Comment:</p> <p>A benchmark of 70% for growers and 80% for agronomists was set: this corresponds to 70% of growers being able to identify endemic diseases in their crops and 80% of agronomists being able to identify the endemic diseases in crops. This is the first time a benchmark for pest and disease knowledge has been determined in the Australian grains industry. Both growers and agronomists met the benchmarks for identification of endemic diseases in crops. However, their knowledge of the top four HPPs was well below this benchmark.</p> <p>This work has been published in the Journal of Crop Protection 2016. Wright, D., MacLeod, B., Hammond, N., Longnecker, N., 2016. Can grain growers and agronomists identify common leaf diseases and biosecurity threats in grain crops? An Australian example. Crop Protection 89, 78-88.</p>
2	-	<p>Output 2 (from Project proposal)</p> <p>A methodological framework for teaching growers and agronomists about plant diseases and biosecurity</p>
		<p>Comment:</p> <p>A theoretical framework was developed as part of the research undertaken. This framework shows that the interaction between training and communication is quite complex. However, information communication tools (ICT) can be used as part of this interaction and provides both information and training to participants.</p> <p>The framework developed is being examined as part of my PhD thesis that has been submitted for examination.</p>
3	-	<p>Output 3 (from Project proposal)</p> <p>Report on evaluation of technology used in training and the uptake by participants</p>
		<p>Comment:</p> <p>In 2015, the series of webinars I ran were held when pest and disease issues were actually occurring in the growing crops. The webinars were recorded, converted into videos and uploaded to the YouTube channel, "Training Growers". This enabled participants within the grains industry to access the information when needed. In the following year, I tested</p>

	<p>the use of podcasts for those in areas with poor access to the Internet.</p> <p>The success of these online methods was demonstrated when the HPP Russian wheat aphid was detected in South Australia in June 2016. Within a week, a webinar was held for agronomists and industry members, explaining how to identify and differentiate RWA from other aphids present in crops. This was the first time a webinar had been held with growers and agronomists in the grains industry for a biosecurity threat. The YouTube video was watched more than 300 times in a week, demonstrating it met the need for up-to-date and relevant information in the industry.</p> <p>Hammond (2010) showed that growers and agronomists might report suspect HPPs, but that there needs to be an easier method to enable this to happen. The development of MyPestGuide (MPG) suite of apps was created to enable such reporting. The MPG reporter app allowed agronomists, growers and DAFWA staff to report the presence or absence of aphids in crops. These data were collated to use as supporting evidence of absence of RWA from Western Australia.</p> <p>My work in using ICT for reporting pest and disease issues in crops was a first for participants in the Western Australian grains industry, and the development of the YouTube videos on current pest and disease issues aimed at Australian growers were the first not developed by professional film-makers. The videos and podcasts were promoted through a new online community called Field Crop Diseases (www.extensionhub.com.au/web/field-crop-diseases).</p> <p>This work has been submitted to the Journal of Crop Protection and is currently under review. Wright, D., Hammond, N., Thomas, G., MacLeod, B., Emery, R., Fagan, L., McCauley, R., Abbott, L.K., (Submitted). The provision of pest and disease information using ICT tools (An Australian example).</p>
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Project results	Please provide brief statements on the results of the Project
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The overall aim of this research was to develop a training and information framework to be used in the Australian grains industry and if appropriate could be used with other rural industries. I chose to examine the ability of growers and agronomists in the Australian grains industry to identify pest and diseases in crops including the top four high priority pests (HPPs) that pose biosecurity threats in crops as my case study. Agriculture in Australia is the second biggest industry and is very diverse in which the grains industry is a major component of this diversity with 32 million hectares planted under crops, and owned by 25,000 business (Keogh & Julian, 2014b). The grains industry includes these major crops; wheat, barley, oat, lupins, canola and triticale. Minor crops include chickpeas, lentils, faba beans and field peas. G. M. Murray and Brennan (2012) estimated that 19.5% of the annual value of crop production is lost to pest and diseases each year. These losses could be reduced by rapid and accurate diagnosis of endemic pest and diseases in crops. This requires growers and agronomists to be able to identify symptoms and signs associated with the endemic pests and the HPPs.

Knowledge levels on biosecurity threats is poor

A training needs analysis (TNA) was done with growers and agronomists examining their ability to recognise and identify symptoms and signs associated with endemic diseases in their crops and the top four HPPs in the Australian grains industry. This research is the first to provide a benchmark on the ability of growers and agronomists to recognise endemic diseases in their grain crops. The results from the TNA showed that 70% of growers and 80% of

agronomists could identify powdery mildew in barley and stripe rust in wheat. However, their ability to recognise blackleg in canola was significantly lower than for the two cereal foliar diseases. Hammond (2010) conducted the first survey of attitudes and behaviours of participants within the Australian grains industry in reporting suspect HPPs and their ability to recognise the symptoms and signs associated with the HPPs. The comparison of results from Hammond's survey and the survey conducted in my research showed that there was no change in the participants' ability to recognise HPPs. My research confirmed that their knowledge and awareness were well below expectations and did not meet the benchmarks of 70% of growers and 80% of agronomists could recognise the symptoms and signs associated with HPPs. Awareness training is provided by Plant Health Australia (PHA) to industries and government organisations. They also provide a range of written publications depicting images of the HPPs (Plant Health Australia, 2015). However, the results from my research and that of Hammond (2010) indicates that the current methods used for training and providing information need to be re-examined and changed to meet the needs of participants within the grains industry.

Further research: Regular TNA should be done with the industry to examine if knowledge levels on HPPs and endemic pests are increasing or decreasing. This could be done also in relation to using ICT as part of the information and training framework. Due to survey fatigue, the TNA could rotate through a different state each year or through the GRDC regional cropping zones for the Australian grains industry. Therefore each group would only get tested every 3 years.

Information and training is not available to all participants

As part of developing the framework for providing information and training to the grains industry, it was important to examine where and how growers and agronomists obtain information, the types of training events they like to attend and whether these training events increase their knowledge levels. One of the major gaps in the literature identified was there is a scarcity of information about agronomists, their demographics, and where and how they obtain information and what training they attend. There is no literature comparing growers and agronomists, and how their demographic profiles influence the choices that they make. My research is the first to compare growers and agronomists in relation to where and how they obtain information, what training events they like to attend and if knowledge levels increased from attending these events.

Information used by growers and agronomists

The capacity building model presented by Coutts and Roberts (2011) showed that the information access leg is very important to groups and individuals in being able to access a range of information at a time that suits them. This model is about having a repository of information. Although having a repository of information is important it does not address the issue that information needs to be presented in different ways to be used by all participants. In the second part of my research I demonstrated that there were distinct clusters within the grains industry on types, sources and content of information participants use. This was done by a targeted survey with growers and agronomists. A PCA was used to categorise the source of information, followed by a cluster analysis to group participants based on their information preferences. Log-linear analysis was then done using the demographics of the participants to characterise the clusters. The clusters were varied and depended on whether participants were looking for information to solve a general problem or a specific problem such as pest and disease in a crop.

To solve general problems on farm, the clusters of participants could be grouped according to the type of information they used; community-, training- and technical based information. My

results showed a disparity between growers and agronomists on sources and types of information used to solve general problems. Growers preferred to use information sources that they trust and are in close proximity such as local community, neighbours and family. These findings echoed those in the literature (Ford & Babb, 1989; Hunt & Coutts, 2009; Llewellyn, 2007). Agronomists did not use community-based information and preferred to use training and technical-based information. Within the clusters for solving general problems, there were two groups that were at opposite ends of the scale; those that used all sources and types of information, and then those that relied solely on their own knowledge and experience to solve problems.

The clusters identified when examining growers' use of information to solve specific problems varied with a preference for information from a private agronomist compared to publicly available sources. The agronomists' preference for information was related to the content of the information and how specific it was to the area they were working within. Within in these clusters for growers and agronomists, there were those that used all sources and those that relied solely on their own knowledge.

So in summary of this section the key concern on the provision of information is there is not enough variety in the sources, and types of information produced and provided to participants. Therefore, when developing and producing information it is important to target the different clusters that are present within the industry and to understand how demographics of the participants influence their choices.

Training used by growers and agronomists

Another important component in the capacity building model is the training model (Coutts & Roberts, 2011). The training in this component can be classified as formal or informal learning, and includes a range of activities. These activities when formalised have a set curriculum and learning objectives. However, Coutts and Roberts (2011) discuss formal training only as the main method for participants within the industry to climb the capacity building ladder. To determine if there are forms of training that growers and agronomists use, a targeted survey was conducted to examine the types of training farmers and agronomists prefer to attend, and why they liked to attend these training events. There is considerable literature on the training of growers mainly in developing countries in relation to pests and diseases in crops, and there are a few that discuss training of growers in Australia and the benefits that it brings to the farm businesses (Kilpatrick, 1997, 2000). There is very little in the literature about the training of agronomists and there is very little comparing the training of growers and agronomists.

My research found that the types of training that the growers and agronomists prefer to attend are quite different. Growers prefer to attend events such as field days that are interactive, allow informal interactions and networking to occur and that these field days need to represent conditions that are similar to their own farm conditions. Whereas, the agronomists prefer to attend both field days and formal workshops as they are able to network with growers and specialists. Both participants preferred to attend events that were perceived to be engaging and useful. Engaging was defined as being interactive and hands on. Useful was in relation to information that could be used. This research provides important information on what type of training events should be targeted towards the participants. For example, a formal workshop on pest and diseases is most likely to be filled with agronomists and very few growers would attend this event. These training events need to include hands on sessions that are engaging and allow for informal interactions to occur throughout the day.

In summary, the training component of the capacity building model, needs to be expanded to include all three types of training; formal, informal and non-formal to provide a range of training that is suitable to all participants within the grains industry.

Further research: Further research needs to be done, including a larger survey, of growers and agronomists to fully understand the cluster profiles that were developed on how and where

they obtain information. By further developing the demographic profiles of these groups, it will be easier to target information so that it is used. There are still participants within the grains industry who rely solely on their own experience and knowledge.

Attending training events increases knowledge levels

There is a considerable amount of literature published on the training of growers and the effectiveness of this training, but most of this literature is written in relation to practice change in a developing country. Other literature examines and discusses behaviour change from growers in developed countries. There is no published literature: a) on the training of agronomists; b) no comparison of growers and agronomists; and c) no discussion on how the training needs of these two groups would be different. In Chapter 6 of this thesis, my research showed that growers had a preference for attending field days and did not like attending formal workshops. Agronomists preferred to attend formal workshops and they also valued field days.

Field days are an effective route for learning, providing opportunities for growers, agronomists and other people in rural communities to assess new technologies including varieties and equipment suitable for in their environments (Amudavi et al., 2009; Wortmann et al., 2011). My research has shown that growers and agronomists value field days and workshops, as they provide an opportunity for them interact with other growers, specialists and agronomists. They value the ability to learn new information and therefore gain new knowledge that they can take back to the farm or workplace.

In summary, these training events are considered to be informal, or non-formal learning events, that result in capacity building. I have been able to demonstrate that, growers, agronomists and other occupations in the agricultural sector view field days and workshops as important training events, which are engaging and useful. In general, knowledge levels increased when attending these activities and most participants would use this knowledge back on the farm or in the workplace. Some participants felt that they had become more aware of issues in crops whilst others had a greater understanding of issues faced by clients. This is vitally important for agronomists to have this understanding because growers prefer highly localised information to solve problems (Llewellyn, 2007).

9.5 The use of ICT to provide information

In Chapter 6, I identified barriers that prevented growers and agronomists from attending training events. Due to these barriers (e.g lack of time, and distance to the training course), the use of ICT was trialled as a method to provide information that was relevant, up-to-date, and could be accessed when growers and agronomists needed the information. Webinars were held when pest and disease issues were occurring in the growing crops, and these webinars were recorded and converted into YouTube videos and placed onto a YouTube channel. This enabled participants within the grains industry to access the information when needed. In the following year, the use of Podcasts was trialled for those in regional areas with poor access to the Internet. The success of these ICT methods was demonstrated when the HPP Russian wheat aphid was detected in South Australia.. Within a week a webinar was held for agronomists and industry explaining how to identify and differentiate RWA from other aphids that are present in our crops. This was the first time a webinar had been held with growers and agronomists within the grains industry on a biosecurity threat The YouTube video had more than 300 views in a week, demonstrating that a need of up-to-date and relevant information within the industry had been met. Hammond (2010) thesis also demonstrated that growers and agronomists might report suspect HPPs, however, there needs to be an easier method to enable this to happen. The development of MyPestGuide (MPG) suite of apps was created to enable this reporting to happen. The MPG reporter app allowed agronomists, growers and DAFWA staff to make reports of aphids in crops, and report on absence of aphids in crops. This data was then collected to use as supporting evidence of absence of RWA from Western Australia.

My work in using ICT for reporting pest and disease issues in crops, was a first for participants in the Western Australian grains industry, and the development of the YouTube videos on current pest and disease issues in crops was a first for Australian growers that was not developed using a professional film crew. The videos and podcasts were also promoted through a new online community called Field Crop Diseases (www.extensionhub.com.au/web/field-crop-diseases).

Further research

- 1) Growers' and agronomists' knowledge, skills and abilities on the identification of symptoms and signs associated with HPPs need to be increased, using a different approach to what is currently being used. The use of webinars and YouTube videos combined with a mobile app should be trialled as a method to increase knowledge. This would require testing growers and agronomists knowledge levels before and after a webinar and the release of a YouTube video and possible a podcast.
- 2) The information and training needs of growers and agronomists are quite different and distinct. These needs are dependent on if the user is solving a general or a specific problem on farm. For specific problems such as pest and diseases in crops the majority of growers would prefer to rely on private advice. This indicates that for pest and disease training, agronomists should be targeted as they are providing the advice to the growers. However, the use of ICT methods should supplement this training by providing information as needed to the industry through the use of webinars, YouTube videos and Podcasts.

9.6 Theoretical framework for information and training

I have proposed a framework (Figure 9.1) that demonstrates the complexity that exists between growers and agronomists and their information and training needs. The current literature tends to look at each part singularly and does not focus on the interactions and differences between growers and agronomists when they are using information or attending training. I believe that ICT provides a great opportunity to connect information and training together that can be used by growers and agronomists and other participants within the industry.

In my proposed framework, the grower and the agronomist are separate identities that interact with each other in relation to solving problems whether they are specific or of a general nature. The demographic profiles of each person are very important (shown by the blue circle in Figure 9.1). My research has clearly shown that the demographic profiles of growers and agronomists clearly influences the sources, types of information available and the types of training events they will attend. This interaction between growers and agronomists implies that the agronomist understands the information needs of the grower, and is able to present this information in a suitable manner. It would be interesting to test this theory and see if it is the case.

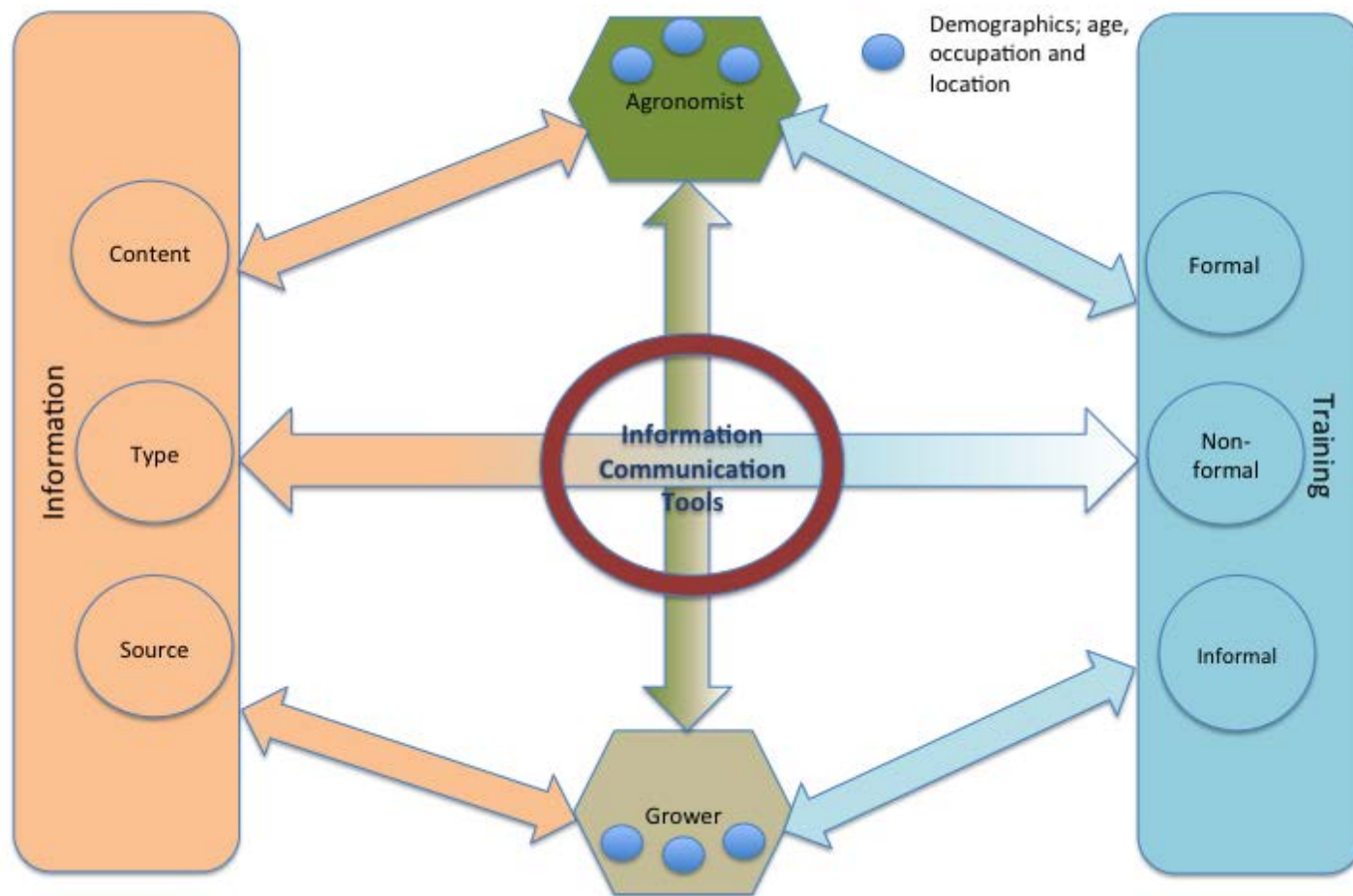


Figure 1. Theoretical framework for information and training of growers and agronomists within rural Australia. The red circle indicates how information communication tools can be used as both an information source and a training opportunity.

On the right and left hand sides of the framework (Figure 1), there is the information area and the training area similar to the capacity building ladder developed by Coutts and Roberts (2011). However, I have shown that within each of these areas are the three main factors (or subgroups) that need to be remembered. Within the information area, growers and agronomists will use different sources, types of information. The content of the information used by agronomists is dependent on if the information is regional, state or local. Within the training area, the training events will either be formal, informal or non-formal. All of these events are able to increase knowledge levels of participants if the training is planned accordingly. However, the training methods used and the information produced have to be relevant to the growers' and agronomists' context and take account of the geographic location, regional setting, level of education, and amount of experience (Franz et al., 2010). Information has to be tailored so that it is understandable by all regardless of their education and experience levels. Presenting the information in different forms according to the demographics of the audience could provide this tailoring.

The red circle in Figure 1 indicates the intersection of information, training, growers and agronomists. This intersection is not discussed in the literature and requires further exploration of methods and tools that can be used. I am proposing that the use of ICT will fill this gap. The range of tools available such as YouTube videos, webinars and podcasts provide a variety of formats that contain the same information but allow for difference in learning to be accommodated. By providing the information in these different formats also reduces the exclusion of those with reduced Internet availability due to the digital divide that exists within Australia.

Recommendations for further research

There are a number of recommendations for further research:

- 1) The information and training needs of growers and agronomists are quite different and distinct. These needs are dependent on if the user is solving a general or a specific problem on farm. For specific problems such as pest and diseases in crops the majority of growers would prefer to rely on private advice. This indicates that for pest and disease training, agronomists should be targeted as they are providing the advice to the growers. However, the use of ICT methods should supplement this training by providing information as needed to the industry through the use of webinars, YouTube videos and Podcasts.
- 2) It is really important when using ICT methods that the Internet divide is taken into consideration. The re-organisation of the information when conducting Webinars and YouTube videos provides participants with the important elements first and then the rest provides the background and the reasoning. This gives participants the choice of just listening to the pertinent bits or to the whole video.
- 3) The use of podcasts for pests and diseases needs to be used more and these need to be available through a RSS feed. This will then provide another source of information to growers who enjoy listening to programs and information when driving on their tractors or in the car. Surveys would need to be done to see how effective these podcasts are for providing information and training to participants.

Recommendations for those organising training events

How often has the cliché “Understand your audience” been sprouted to those who are giving presentations and organising training events. My research indicates that this is still an essential feature, and not always remembered within the agricultural industry.

Field days

For field days I would suggest:

1. That there is plenty of time available for informal interactions between growers and other participants.
2. Agronomists would welcome networking opportunities as well, so time is required for this to happen.

3. That there are hands on activities for the growers.
4. That your presenters are engaging and interacting with the audience¹. For this to happen, the presenters need to understand how to do this.
5. Ensure what is being demonstrated at the field day is indicative for the local farms in that area.
6. Presenters really need to understand the local area and the issues that are common for farms within that area. For example, there is no point for a plant pathologist from Western Australia going to Queensland to talk about yellow spot in wheat when farms in Queensland do not have yellow spot in wheat as a major disease. The information that is presented needs to be local and relevant.
7. Ensure that you have adequately advertised the event.
8. I would suggest that because there are so many different activities occurring at the same time at a field day, that talks that are short and to the point could be recorded to be made into a podcast or recorded using a video camera to be converted to a YouTube video for others to view later on.

Workshops

For workshops I would suggest:

1. That time is allowed for agronomists to network before, during and after the event.
2. That there are hands on activities (especially when teaching about pests and diseases in crops).
3. Activities that create interaction, and that are engaging are very important. These interactions with other agronomists, or other participants can provide powerful learning opportunities.
4. The information needs to be relevant to the local area or generic with localised examples.
5. The information presented takes into consideration the demographic profiles of the group that are attending the workshop. This may mean that you need to have the same information available to participants in a number of different formats.

Recommendations for providing Webinars, YouTube videos and podcasts

When developing webinars, Youtube videos and podcasts I would make the following suggestions:

1. The information provided when using these tools needs to be short and sharp. This means restricting the number of slides used in a webinar to 10. In my research I found the most popular format when discussing pest and disease problems in crops, that a summary slide is provided first. This allows for the participants to digest the information, as you explain further information and then there are more likely to be questions at the end.
2. When providing a webinar, have a moderator as well as the presenter. It is much easier and less stressful for the presenter if the moderator is dealing with the questions coming in from the participants.
3. As the moderator, check the presenters PowerPoint, as many will put in slides that are not pertinent to the problem being addressed. I would also do practice runs with the presenter so that they get use to talking to a screen and are not put off by not seeing their audience.
4. I would have a couple of questions that the moderator can ask at the end of the webinar, as this allow participants to think of questions and ask them. Provide the opportunity for verbal and written questions to be asked.
5. The YouTube videos do not need to be made professionally. Many of the participants within the grains industry, told me personally that they preferred the ones I created, as they were not shiny and glossy, and they had a down to earth feeling about them. This meant that the videos felt more real to the participants.

¹ I have observed researchers present graphs and statistics to a group of growers on pieces of cardboard (no PowerPoint presentations were used) during a field day and when I looked around the room, greater than 50% of the audience were asleep.

6. Podcasts need to have a relaxed interview style for the growers and agronomists to appreciate the information. When preparing the podcast, provide the list of questions to the researcher before you interview them.
7. In reality, it is much easier to do the podcast soon after the researcher has completed the webinar. The information is fresh in the presenters mind and the interview comes across more naturally.
8. The most important item is to ensure that you have access to these tools, and that the organisation you work for supports the use of these tools and has the capability of hosting them.

Conclusion

In conclusion, my research has shown that the provision of information and training to growers and agronomists within the Australian grains industry is diverse and there is not a single solution that can be used to provide this information and training. Much of the research within the industry on capacity building focuses on the growers and forgets the very close relationship between growers and their agronomists. My research is the first reported in the literature that compares growers and agronomists in the Australian grains industry on their information and training needs. The demographics of the participants influence their information and training needs, and it is important to use and understand these differences when designing and providing information and training to the industry

3. Project resources	This section describes use of the funding listed in the initial plan and any refunds due to COGGO
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Expenditure of funds requested from COGGO	\$ Total funds budgeted	\$ Total funds expended (actual)	\$ Total funds requested from COGGO*	\$ Total COGGO funds expended	\$ Refund due to COGGO of any unexpended COGGO funds
Salary/Contractors	0	0			
Operating costs	45,000		45,000		8,479.20
Capital	0				
TOTAL					

*Funding provided by COGGO.

IMPORTANT: Return of unused funds to COGGO is required as per *Clause 3.3* of the Research Agreement.

4. Commercialisation	<p>Insert details of the proposed commercialisation process, as applicable, with reference back to the planned commercialisation plan in the project proposal) for any outputs from the project.</p> <p>This should include recommendations for the commercialisation of the results of the project and the registration or other protection of Project IP and Project Confidential Information as per the Research Agreement.</p>
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N/A


It is understood that this may require further discussion and agreement with COGGO via its' agent GIWA, as per the undertakings given and terms agreed, in the project proposal. This can be the subject of an appended letter and attachments. In all cases such discussion and subsequent agreements need to be governed by *Section 8 Project IP, Improvements and Project Confidential information* of the Research Agreement.

<p>5. Communication/ Extension</p>	<p>Insert details of how the communication and extension of the project outcomes has been achieved to date and recommendations for future activities to disseminate and promote adoption of the results of the Project.</p>
<p>Royal Society of Western Australia Centenary Postgraduate Symposium September 2014 (seminar) Australasian Plant Pathology Society Student Symposium November 2014 (seminar) School of Earth and Environment Student Symposium. November 2014 (seminar) GRDC Agribusiness Perth Crop Updates 2015 (paper and poster) Australasian Plant Pathology Society September 2015. Manuscripts submitted for publication</p> <ol style="list-style-type: none"> 1) Can grain growers and agronomists identify common leaf diseases and biosecurity threats in grain crops? An Australian example. This was published in the Journal of Crop Protection 89 (2016) 78-88. 2) Grain growers and agronomists use different information sources to solve on-farm problems (An Australian example). Manuscript submitted to Journal of Agricultural Extension and Education. Revisions have been completed and resubmitted. 3) The provision of pest and disease information using information communication tools; an Australian example has been submitted to Journal of Crop Protection and is under review. 4) Evaluation of training as part of the capacity building ladder in Australian agriculture. Submitted to the 23rd European Seminar on Extension and Education, Chania, Greece in July 2017. This has been accepted as an oral presentation. <p>The use of webinars and Youtube videos were trialled as an extension method to provide information to growers and agronomists. Topics were selected from PestFax reports on pest and disease issues that were impacting on crops, such as Powdery Mildew. Nine webinars were held with agronomists and these were recorded and uploaded to a Youtube channel created "Training growers". I developed 10 videos in conjunction with Plant Pathologists and an Entomologist from DAFWA. These videos have been very popular with 700 views during the four months of the growing season. Further webinars were developed and YouTube videos provided to the grains community on pertinent topics during the growing season. Podcasts were also developed after growers requested that these be made available. Training for agronomists was held in August 2014, 2015 and 2016 at the Department of Agriculture and Food, Western Australia (DAFWA). There were 25-30 participants each year. The groups were above maximum capacity (20), and further requests to attend were received. Feedback from the participants was positive. Most of the feedback showed that knowledge increased, and many enjoyed the practical sessions with live plant samples.</p>	
<p>Note: As per <i>Clause 7.3 (b) (ii)</i> of the Research Agreement COGGO may require the Researcher to produce an edition of the Final Report in a form suitable for general distribution. If so required by COGGO,</p>	

the Researcher must produce a non-confidential version of the Final Report within 28 days of receiving a request to that effect from COGGO.

6. Certification

The Project Supervisor and the Research Organisation certify that all information contained in, and forming part of, this final project report is complete and accurate. The project supervisor and research organisation further warrant that the project complied with all the relevant guidelines affecting the conduct of research, for example in relation to ethics, bio-safety, environmental legislation, GMAC or National Health and Medical Research Council Codes.



Project Supervisor's signature

LYNETTE KAY ABBOTT

Name (in Capitals)

Date: 12 June 2017



Research Organisation signature

Name and title of authorised signatory (in Capitals)

DANIEL MURPHY

Date: 14 June 2017

Completed Final Project reports

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COGGO representative

For the purpose of this Project agreement contract, COGGO will be represented by Grains Industry Association of Western Australia (GIWA), or such other representative that is nominated by COGGO as authorised to operate on behalf of COGGO.