Know-how for Horticulture

A coordinated approach to the dissemination of brassica disease research and development through Better Brassicas

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VIC Department of Primary Industries

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Final report for the project VG 04014
(June 2006)

Better brassieas - a coordinated approach to the dissemination of brassica disease R&D.

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This report is the final report for the Better Brassica project (VG 04014). Front

cover picture shows Caroline Donald presenting at the Penrith workshop.

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Media Summary

The Brassica industry has made significant investment into researching pest and disease issues faced by the industry. A few years have elapsed since some of these projects finished. Results of this research are highly sought after but have not always been easy to access particularly if the project has been completed. The industry R&D committee decided they needed a better way to deliver this information to industry.

The better brassicas project was the result. It was designed to collate and deliver the most up to date information from current and recently completed disease management projects. This was done through a number of workshops in all the main production areas in Australia. To supplement the workshops a series of publications such as fact sheets, posters and newsletter articles covering the management of clubroot and white blister, in particular, but brassica diseases in general, were produced.

Workshops were held in

Victoria	**Western Australia**	**Tasmania**
Cranbourne	Perth	Devonport
Werribee	Manjimup	
Bairnsdale		
New South Wales	**Queensland**	**South Australia**
Penrith	Gatton	Virginia
Bathurst	Stanthorpe	

The topics covered at the workshops included

- management of clubroot
- white blister predictive modelling and fungicide control
- brassica IPM
- local industry issues, eg emerging disease issues, water, biosecurity, government policy etc.

The project evaluation showed that as result of information they received as part of the project, two thirds of surveyed workshop participants had made changes to their farming practices. Copies of posters and fact sheets were sent to all growers on IDO lists. One third of the surveyed growers who had received the information in the mail had also made changes. These changes included trying new varieties, improved farm hygiene, different chemical and/or irrigation practices and changing the soil pH.

There were many advantages to a coordinated approach to delivery of R & D outcomes including: economies of scale, grower willingness to participate and the elimination of state bias in information delivery. While the workshops did not reach all growers, those that attended were overwhelmingly positive in their feedback about the workshops. Extension of R&D requires a range of delivery methods. For those receptive and interested in attending workshops, this type of approach would appear to be a useful tool to deliver R&D information and achieve practice change. It is recommended that national road show type events, focused on one commodity to ensure the audience finds them relevant, should be conducted every three years. High quality supplemental publications would be needed to compliment these events because workshops are only ever going to be attended by a proportion of the industry.

Copies of the posters and fact sheets are available from the Vegetable Industry Development Officers or by contacting Caroline Donald at the Victorian Department of Primary Industries - Knoxfield.

Introduction

This project was designed to deliver information and stimulate adoption of disease management practices resulting from brassica research.

Brassicas are one of the most widely researched vegetable commodities in Australia. Clubroot has been researched for over 5 years and effective management recommendations exist. Whilst the project has been completed for several years the information is still relevant and current. The demand for information is high and ongoing however there was no mechanism to deliver project information once the research project was completed. White blister *(Albugo Candida)* research is relatively new and there is a keen interest in learning about the disease as it spreads throughout Australia's growing regions and obtaining up to date information on forecasting and control.

The need for this information to be captured so that it could be made available to all growers on an ongoing basis after the completion of the research was identified as a high priority by industry and researchers. It was critical that this information be delivered in a way that was practical and user friendly. The HAL brassica commodity group requested an ongoing means of information delivery to industry and listed this in its industry R&D priorities. This could be achieved through the publication of a series of disease management fact sheets that could be referred back to as the need arose. However, due to the large amount of information that had been generated from the research projects and the complexity of some of this information there needed to be personal contact with the researchers and opportunity for discussion and sharing of grower experiences. Workshops as part of a travelling roadshow were thought to be a good method of achieving this interaction.

This series of workshops and supporting materials (fact sheets, disease notes, posters and newsletters) would also provide the first opportunity for the research findings to be presented as a complete management package. This could potentially have a great impact on the industry as growers become better equipped to implement on-farm practice change that could reduce the spread and severity of the diseases, reduce costs and environmental impacts and give them a sense of control over the disease and their futures.

Technology transfer strategy and methodology/activities

This project was designed to enhance the ability of growers to understand and use the results of research to control vegetable brassica diseases. The strategy that would give the greatest benefit to the largest number of growers was to hold workshops in each of the major growing regions of Australia. This would allow growers to meet face to face with researchers and to be able to ask questions and experience hands on demonstrations such as test strips and disease modelling.

Workshops were held between October and November of 2005 in:

		Attendance
Victoria		**34**
04-10-2005	Cranbourne	12
06-10-2005	Werribee	11
07-10-2005	Bairnsdale	11
Western Australia		**42**
12-10-2005	Perth	20
13-10-2005	Manjimup	22
New South Wales		**37**
17-10-2005	Penrith	24
18-10-2005	Bathurst	13
Queensland		**39**
24-10-2005	Gatton	13
25-10-2005	Stanthorpe	26
South Australia		**20**
04-11-2005	Virginia	20
Tasmania		**21**
10-11-2005	Devonport	21
Total		**193**

The workshops were designed and facilitated by an experienced extension facilitator. The facilitator was able to incorporate adult learning principles such as building on prior knowledge and allowing time for planning future activities, into the workshops to ensure optimum learning conditions. Having an outside facilitator also brought the benefit of allowing the researchers to present their material and not have to worry about how to structure the program and run the evaluation and planning sessions. They could concentrate on what they were good at - the science of the disease. The facilitator was able to work with presenters to ensure their presentations were pitched at the right level for growers and included all relevant information.

Researchers who worked on brassica related projects were invited to present at the workshops. There were a number of people who took up the opportunity to present in their home state although disappointingly they were not able to travel to other states.

A list of other researchers and the topics they presented is as follows

Western Australia
Andrew Reeves, Agriculture WA. Biosecurity
Queensland
Bronwyn Walsh, QDPIF. Brassica decision support tool
Jack Millbank, Vegetable IDO. National Vegetable R&D Priorities
Vanessa Kennedy, Brisbane Market Authority. Brisbane market grower services.
Margi Millgate & Jane Muller, Growcom. Environmental policy and water use.
Brendan Nolan, QDPIF. White-collared ladybird and white-fly
South Australia
Catherine Hitch, SARDI, Stem canker effecting brassica crops
Tasmania
Hoong Pung, ServeAg. Fungicide control of White blister.

Workshop Agenda Welcome and introduction

Delivered by the facilitator or the state host for the meeting eg. IDO or DPI representative.

Disease quiz

The quiz was used as an ice breaker to help the group feel more comfortable with each other and it gave the presenters important feedback on the level of prior learning and interest in each of the presented topics. This allowed presenters to modify their talks to suit the audience.

Clubroot presentation

Presented by Caroline Donald

Local researcher's presentations

Depending on how many extra speakers there were some of these talks may have also been delivered in the second half after the break.

Break

Allowed the participants to stretch their legs, look at the exhibits and refocus their minds.

White Blister presentation

Delivered by Elizabeth Minchinton and Joanna Petkowski

Goal setting

This activity was run by the facilitator and was different for each group depending on numbers and the level of group interaction.
Examples of activities included writing out something that participants had learned, something participants wanted to implement or something they were already doing that was confirmed by the workshops. Voting on a number of listed topics and suggestions (that the audience had come up with) as to what they were likely to use in the future was another activity commonly used.

Evaluation

The facilitator also delivered this and different activities were used depending on the group dynamics. Examples of activities included Sociometery and Bulls-eyes (see the evaluation section for explanation of these techniques). Participants filled out an evaluation sheet at the completion of the event (see appendix 1). This sheet was very helpful in redesigning the early workshops to better meet industry needs.

Meal

A meal was also served as part of the workshop usually at the end but sometimes at the beginning depending on the time of the meeting.

Project Publications

The publication of newsletters and supporting materials (such as fact sheets, disease notes and posters) supplemented the workshops and allowed the project to reach those growers that were not able to attend a workshop. A series of fact sheets were produced for the management of clubroot and a disease note series for white blister. These were presented in a practical plastic pack so that industry would have a ready reference that they could refer to in future. These sheets were referred to throughout the talk and it saved growers from having to divide their attention between listening and note taking.

There were 10 clubroot fact sheets and each sheet covered a different aspect of disease management (see appendix 2-11). This was also summarised as a poster which listed the key information and could be put up on packing shed or office walls, (see appendixl2). A poster on banding of fertiliser was also published (see appendix 13). A set of clubroot notes and a poster produced in a previous project, were made available to seedling growers as they have a number of different issues compared with growers. Prevention of the disease in the nursery is a major tool in stopping the spread of the disease particularly to uninfected sites.

Keeping Clubroot Out Fact Sheets
Sheet 1 Integrated control of clubroot - Introduction
Sheet 2 Disease Detection and Prediction
Sheet 3 Clubroot prevention - Farm hygiene
Sheet 4 Managing new and isolated outbreaks
Sheet 5 Limes and liming
Sheet 6 Nutrient amendment
Sheet 7 Chemical control of clubroot
Sheet 8 Strategic application
Sheet 9 Strategic application - machinery design
Sheet 10 Integrated control strategy - implementation

Poster - Clubroot control in the nursery
Poster - Clubroot control on the farm

There was also a series of 4 notes produced for white blister management (see appendix 14-17). Because research into white blister has only been going for a couple of years the notes covered what was known about the disease and predictive model but were not as comprehensive as the clubroot notes. It was seen as too early in the research to produce a complimentary poster for white blister.

White Blister Control Notes Note 1
Introduction Note 2 Options for control
Note 3 Control strategies for white blister
Note 4 a. White blister races b. Seed
health test

The two sets of notes were also produced in a cardboard folder as a 'mail friendly' version that was sent to all brassica growers who did not attend the workshops. This was done via the Industry Development Officers (IDOs).
The mail out was received by the following number of industry personnel as per the IDO databases.

TAS 80	VIC 280	NSW 280	
QLD200	WA230	SA 100	Total 1170

The number of editions of 'Brassica IPM' a SARDI based newsletter was doubled for the duration of the project with DPI Vic (Brassica diseases) and SARDI (Brassica pests) alternating ownership of the content. This decision to increase the number of issues of an existing publication rather than develop another newsletter was made at the beginning of the project in conjunction with the HAL Brassica commodity group. The project team wrote the following articles and were responsible for sourcing the remaining articles in the 'disease' issues of the newsletter: See appendix 18abc and 19abc for copies of the newsletter.

Articles
Exposing White Blister Issue 5 Sept 04
Imminent release of clubroot resistant vegetable brassicas, Issue 7 July 05
Field diagnostic testing for clubroot, Issue 7 July 05
Clubroot Management, Issue 7 July 05
Roadshow tours Australia, Issue 8 January 2006
Taking the heat out of white blister, Issue 8 January 2006
Becoming Strategic about clubroot, Issue 8 January 2006
Towards clubroot resistant brassicas, Issue 8 January 2006
A further disease based edition of the newsletter is in production.

Evaluation and measurement of outcomes - impact and adoption

Introduction
The evaluation and monitoring for this project was undertaken by answering three key evaluation questions. The evaluation is based on Bennett's Hierarchy (Table 1) and is useful in determining if the project has been able to influence and get industry adoption of practice change, ie was the information used, and was the most appropriate delivery methods were used.

There were two Key Evaluation Questions (KEQ) established to determine the impact the project has had on industry and one to determine if the project used the best methodology. A KEQ is a broad overarching question that is used to give an evaluation context and direction. The three KEQs that were used were;

- What is the change in industry behaviour as a result of this project?
- What impact has that change had on the industry?
- Were the roadshows the best way to deliver research information?

In addition to these three larger questions there were a number of questions asked to ensure continuous improvement of the workshops. This meant that changes could be made to the workshops and individual presentations to ensure growers were getting what they wanted. The rating of sessions presented in the workshop are shown in Tables 2-5.

The evaluation was conducted in two parts. The first part was conducted in the workshop sessions and the second part was undertaken as a phone survey, conducted approximately six months after the workshops, to gain an understanding of what, if anything, had changed as a result of the better brassica project.

The evaluation during the workshops consisted of group activities such as Sociometery where participants line up on a continuum to represent how much they have learnt (see photo 2) and bulls-eye targets where participants put dots on a target to represent their answers. The technique used at each workshop was decided based on numbers and group dynamics. Participants also completed an evaluation form at the end of the workshop (See appendix 1). As well as giving a rating for each session the form asked for suggestions for improvement and asked what growers were likely to do in future as a result of the workshop.

Photo 2 Manjimup workshop participants lining up to represent how much they knew[1] about white blister before the workshop.

The phone survey was conducted to get an idea of the likely impact the workshop and printed material had had on industry behaviour. A sample of growers that had attended the workshop was rung and asked a number of questions:

* Is white blister a problem tin your farm?
* Is clubroot a problem on your farm'[5]
* What can you recall from the workshops'[7]
* What did you receive at the workshop[9]
* Did you get a chance to read it?
* What if anything have you done differently as a result of attending the workshop and receiving the handouts?
* What impact has this had[9]

A second sample of growers who had not attended the workshops were also contacted and asked a set of questions

* Is white blister a problem on your farm[7]
* *h* clubroot a problem on your farm?
* Do you remember receiving any information about the diseases clubroot and white blister? (If growers answered no they were prompted with a description of the notes and newsletter?)
* Did you get a chance to read it?
* What if anything have you done differently as a result of this information?
* What impact has this had?

Publications

The results of these phone surveys showed very clear patterns. All of the surveyed growers who had attended the workshops (from now referred to by *AW') remembered receiving the handouts and 16% remembered receiving the poster. By contrast the surveyed growers who did not attend the workshops (from now referred to by *DNAW) were much less Jikely to remember receiving any information. 25% did not remember receiving any information about clubroot or white blister and a further 25% did not specifically remember receiving the handouts but they did receive information about the disease in various publications. No one specifically mentioned by name the Brassica IPM newsletter. There were some growers who said

"I get stuff in the mail all the time, from DPI and other places"

indicating that they do not differentiate between the extension publications that they receive and see it as all coming from one source. WA Grower and Vegelink were mentioned by name.

All AWs said they had read or glanced through the printed material as did all DNAWs who said they had received something. 84% of DNAWs kept the information for future reference. This was because they were only just coming into their growing season, they did not have the disease present on their land or the levels of the disease were under control. A small number of growers said they had looked at the notes recently.

Key Evaluation Questions
Ql What is the change in industry behaviour as a result of this project?

There were extensive changes in industry behaviour particularly considering the project may have only had a few hours contact with a grower and in many cases less than that. The scope of the change was quite wide and most growers reported multiple changes. Two thirds of surveyed participants in the workshops (AWs) and one third of the surveyed growers who received the publications (DNAWs) said they had made some change on their farm.

These changes included 25% of AWs had changed their chemical application.

"I banded my Shirlan® this season 17% of AWs had improved their machinery cleaning program, with an additional two growers reporting they had improved their crop hygiene such as getting rid of trash quickly.

"I spoke to my nursery to check on their hygiene protocols." 20%) of AWs had made changes to pH or the way they raise the pH with many growers reporting that they were already managing pH but they are now doing it differently or are more confident in doing so.

"I use hot lime now" DNAWs reported the same sorts of changes in lower numbers although interestingly 25% of DNAWs had changed their irrigation practices compared to only two growers in the AWs group.

"I don't fertilise through sprinklers any more." A few of the changes were unexpected such as two growers deciding not to grow broccoli any more.

"I stopped growing broccoli now and just do cauliflower."

1/3 of Attended Workshop growers (AW)s did nothing different (25% because they were already doing it all,)
2/3 of Did Not Attend Workshop growers (DNAW)s did nothing different (16%> because they were already doing it all)

There were many growers who reported that they were more confident in what they were already doing as a result of the project, or that it was a good reminder of what they should be doing. Although this does not indicate a change in industry behaviour it is still a very good outcome as it builds the capacity of the whole industry and reinforces grower confidence.

Because the white blister research has not progressed to the point of a set of management principles, the changes that growers have adopted are more in the area of monitoring and disease prediction. As a result of the information presented at the workshop a number of growers have been able to make spray decisions based on the likelihood of the disease occurring.

*Case **Study** 1 -A grower who attended the workshop is now determining when to spray based on the predictive model that was presented in the workshop. He receives information from a locally based weather station on a near-by grower's property. This information is compared with a set of risk factors to determine when the disease is likely to appear. This has encouraged him to closely monitor his crops in the danger periods and to apply a preventative/control spray when necessary.*

Q2 **What impact has that change had on the industry?**

It is perhaps too early to answer this question in full. There are a number of changes that have been reported and some growers were able to indicate what impact that had made but many were not. Many growers said it was too early to say what impact the changes had made and some said they were soon to harvest their crop so would wait until then to decide.

Case Study 2 -Perhaps the most dramatic change reported was from a grower who in his first planting had not had time to band and incorporate his Shir Ian® as per the recommendations in the workshop and notes. But he did do it in subsequent plantings. He reported loses o/60-70% because ofclubroot in the un-bandedfirst planted crop compared with 4-5% losses in the other crops where he had used the banding technique.

Growers who had made changes in hygiene practices were usually doing so because they were trying to stop the spread of the disease or because they did not yet have it on their property. None of these growers had noticed the disease spread this season. This is a positive impact for their farm and while it cannot be demonstrated it is likely that improved hygiene practices have at least been in part responsible.
Both growers that have stopped producing Broccoli said it had had a big impact on their farming operation but were not able to quantify to what degree.

Another grower said that the changes he had made meant that he had an increased workload. He did comment that it was worth it from an economic point of view.

The general opinion was that there were positive changes made to most farming businesses as a result of the change and they could perhaps be summed up by these three growers' quotes...

> "I can grow over a longer period, it's given a long term perspective on how I can be growing for the next 30 years."
>
> "every little bit helps"
>
> "if I didn't do it (hygiene) and I got an infection, it would be a bloody disaster."

Q3 **Were the roadshows the best way to deliver research information?**

The workshop evaluation asked the question "Do you think a workshop is the best way to keep the industry informed about disease research?" There were no NO responses and only two respondents out of the 134 who answered said they were NOT SURE. On the face of it that may seem like an outstanding success rate and we could be quite confident that we had chosen the correct delivery method. But it must be remembered that we are using a sample of people who attended the workshop. Therefore these people are already biased because they are the ones who attend workshops.

The number of mail-out packages compared with the number who came to the workshops shows that there is a large number of growers who did not attend the workshops. In fact only 10% per cent of industry attended a workshop. There may be many reasons for this such as other commitments, distance to the venue or they are no longer growing brassicas. But it should also be considered that many growers do not attend meetings and workshops. Information delivery and particularly in relation to getting industry adoption requires a range of delivery methods to suit the differing requirements of growers. One size does not fit all.

It was beyond the scope of this project to determine the best methods of delivery for all growers, however, anecdotally the number of growers attending this type of multi topic based workshop tends to be greater than a single issue workshop. Workshops may only reach the most receptive growers but they are likely to provide maximum impact for these growers.

The evaluation asked for other ideas for delivering information and the most common response was to incorporate a field day or in-field demonstration.

"Incorporate a field walk if possible" Manjimup The second most common response was to do a mail-out of information, but there was no clear pattern of what format that should take. Suggestions offered were

"Plenty of information sent out as pamphlets or discs." Werribee

"DVDs / videos." Perth and a number of people who suggested mail-outs but did not specify what sort. This again reinforces the idea that a range of approaches is important.

"Most issues need a combination of extension strategies to be successful" Gatton

Discussion

As a result of this project all known brassica growers nationally were presented with the latest research findings from brassica disease projects using a variety of delivery methods. An evaluation of the project indicated industry practice change, with two thirds of surveyed workshop participants and one third of surveyed growers that received project publications but did not attend a workshop indicating that they had made some change on their farm as a result of the project.

Information was sent to all stakeholders and 50% remembered receiving it and 84% of those indicated that it was valued. This project did not evaluate the format of the printed information but we know that presentation is critical with growers preferring to receive information in short concise publications which stick to the facts of what they need to know or do on the farm. (VegCheque Triennial Project Report 2000-2003, Peter J Carr (2004))

The phone survey showed that there are more growers with clubroot on their property than white blister. Of the surveyed growers attending the workshops 54% had white blister and 58% had clubroot. Of the surveyed growers who had not attended the workshops 25% had white blister and 33% had clubroot. The higher levels of disease amongst workshop participants shows that growers who consider they don't have a problem are far less likely to come to a workshop even though there was a strong focus in the workshop about preventing the disease from getting onto the farm. Perhaps this disease prevention message needs to be more clearly spelt out in the workshop advertising material so that growers who don't have the disease see that it is relevant to them also.

Of interest is the low turnout in the strong brassica production areas of Werribee (3 growers and 1 nursery) and Gatton (2 nursery). This may be because the growers have had more exposure to the issues and did not believe the workshops would have additional information to offer and thought that they were managing the problems. A different approach may be needed for these areas, and it should also be remembered that overall only 10% of industry attended a workshop. This again demonstrates that it is difficult to reach all sectors of the industry with one delivery method and workshops are not going to do this on their own. Information delivery requires a range of methods but information delivery alone does not ensure adoption and practice change.

Evaluation of this project (indeed most agricultural extension/adoption projects) is hampered by the need to report back on those findings before there has been the necessary time for the results to be trialed by growers. In some of the places where workshops were presented there has not yet been a complete growing season to assess the impact of changes made as a result of this project. Therefore it is difficult to give an accurate picture of the likely impact of change. In places where there has been a growing season, disease pressure may have been higher or lower than usual due to weather conditions, this also makes evaluation of the impact difficult.

It is important to remember that there is a range factors that will influence the adoption of technology. There are always going to be sectors of the vegetable community that are not able to change their practises. There could be many reasons for this such as economic constraints, limited resources or existing technology and infrastructure.

It needs to be recognised that there are a range of reasons that farmers change practices and they are not solely technical or economic but are also cultural and social. Vanclay (2004) lists 27 principals as the basis for action or behaviour. It should therefore not be seen as a failure of

the delivery method if recommendations are not automatically taken up by all sectors of the industry. Adoption could proceed over a number of years as grower's circumstances change.

Recommendations

Workshops

In general although only 10% of industry attended, the brassica road shows (workshops and take home material) indicate that a coordinated response is an effective way to deliver information and engage growers in discussion and planning for future action on their property. It makes sense to have a number of researchers present their work at one big event rather than expect growers to attend numerous smaller 'single issue' meetings. This must be balanced, for there is a risk of losing the audience if it is too long or has too much information. A larger attendance is likely as growers feel it is worth their while to come along as a number of topics are being covered and one is sure to be useful to their situation. It is also cost effective to send out one invite, hire the venue and provide a meal for participants and use it for more than one presenter. This type of event also builds links between interstate researchers working on the same crops and provides opportunity for review and discussion of current work and identification of emerging industry problems.

It is quite important that the meeting is well facilitated so that it does not become long and tedious if many people are presenting. Include a range of activities in shorter chunks to keep people interested. Awareness of an issue does not automatically lead to practice change and so there needs to be an incorporation of adult learning principles into all events. This would include sessions building prior knowledge, allowing time for reflection and review and incorporating a time for planning future actions. From the workshop evaluations it is clear that future events should incorporate a paddock based session where possible and lots of hands on activities if a paddock session is not possible. High quality follow-up resources are also needed so that growers are able to refer back to what was presented at the road show.

Coordinated delivery

A key finding of this project is that there are many advantages to using a coordinated approach to the delivery of R & D outcomes including economies of scale. Both growers and researchers are time poor. Attendance at a single, well organised event for each commodity is much more attractive to growers than requests to attend many small 'single issue' meetings. Similarly, researchers are more willing to present to a larger, enthusiastic audience. Perhaps the IDO network could be involved in organising commodity road shows every three years to travel around Australia and present R&D work. This would not only force all researchers to be involved in delivery of research outcomes, it would also eliminate any state bias from projects. This could be done for any crop not just brassicas, assuming there was enough work to present.

Other techniques

Static displays at workshops such as these need to, where ever possible, include something that is referred to in the talk. They tend to get passed over in favour of chatting if there is not something to catch people's attention. Another good way to draw attention to them is to have something that can be experienced, this may be through being able to pick it up, have a go at using it or watching it being demonstrated. Posters of farm machinery were a practical way of showing what could be done but they would have been far surpassed by being able to see the machine working in the paddock.

Although not tried in this project there could be a range of other techniques that could be used to deliver information to growers and help to facilitate adoption. These techniques would

depend on the information being presented and would also depend on how wide the relevant audience was. Examples of other techniques include the use of on-farm trials, recommendations to chemical resellers, training programs, adoption of findings into apprenticeships and TAFE training courses, study tours, conference presentations and instruction manuals.

- Carefully consideration should be undertaken of the best approach and the likely drivers of adoption when choosing the appropriate technique.
- It should also be noted that information delivery requires a range of methods but information delivery alone does not ensure adoption and practice change.

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