Australia's National
Science Agency

Agripest Challenge Workshop Report

Workshop 1 – Starting the national conversation

16th and 17th June, 2021

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Acknowledgments

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The workshop was organised in collaboration with Susan Maas (Cotton Research & Development Corporation), Nicola Cottee (New South Wales Environment Protection Agency) and Chris Cosgrove (Sustenance Asia). The meeting facilitator was John James (Enablers of Change).

The CSIRO team comprised Sharon Downes, Peter Hunt & Hazel Parry (organisers), Barton Loechel, Tony Vuocolo, Sarina Macfadyen, Gupta Vadakattu, Darren Kriticos & Tom Walsh (break out room facilitators), Sandra Williams, Liana Williams, Andrew Kotze, Javier Navarro Garcia, Anu Kumar, Rai Kookana, Louise Thatcher, Wee Tek Tay, Sam Beckett and Keith Hayes (break out room note takers and reporters).

This report was prepared by the Agripest Challenge Workshop committee and is based on the workshop notes collected by CSIRO staff. The report is a compilation of stakeholder views and is not necessarily the view held by CSIRO, CRDC, NSW EPA or Sustenance Asia. We note that our attempt to synthesize diverse views may not match exactly with what was initially stated or written.

Executive summary

Main findings

The purpose of the Agripest Challenge (our vision statement):

Avoid a future risk of failing to control agricultural weeds, pests and diseases while maximising profitability, ensuring safety, minimising environmental impacts, and doing so in ways that are accountable, transparent and agreed along the supply chain.

The workshop:

A range of stakeholders from across the supply chain were engaged to provide initial feedback on strategic priorities and outcomes for sustainable agripest management and agrichemical use.

Outcomes:

There was a consensus that a coordinated approach should be considered, and that collaboration and mutual understanding would be needed.

There were divergent views on what the strategic priorities for sustainable pest management should be. These views were generally shaped by (organisational strategic objectives, client needs, where organisations sat along the supply chain, the appetite for change regarding total volume of pesticide use).

The next steps:

Further engagement with workshop participants and other stakeholders to develop a strategy for:

- A coordinated national approach.
- Communication between stakeholders with differing needs.
- Delivery of actions toward the vision of durable agripest control.

Overview

Weeds and insect pests have a significant impact on agricultural production. Widespread and increasing adoption of integrated pest, weed and disease management strategies is seeing a range of tools used in food and fibre value chains for agripest control including crop and pasture rotations, encouraging populations of beneficial insects, birds and bats, genetic technologies, weed control by tillage, and the use of pesticides. Australia has a world-recognised and respected, scientifically proficient regulator that assesses all pesticide products for their safety to humans, off-target species and the environment before they are registered for use in Australia. In addition, programs and codes of practice are in place for responsible chemical use on farms and in storage and handling. So, in many ways, Australian agriculture has been proactive in managing agripests responsibly.

However, throughout the food and fibre value chain, many participants require increasing assurance that agripest control has been conducted safely for people and the environment. In a recent survey of community trust in agriculture two thirds of Australians think farmers should find better ways

than using chemicals to control weeds (Agrifutures Australia, 2020). Producers face restricted access to chemicals driven by regulations, market access, customer requirements and resistance. At the same time, novel agripest management options are being introduced. In this changing production system, there is a challenge of maintaining communication and trust about the sustainability of agripest control methods.

CSIRO's view is that this operating environment means there is a need for a national conversation to transform how we sustainably manage weeds, pests and diseases.

This is the Agripest Challenge: to avoid a future risk of failing to control agricultural weeds, pests and diseases while maximising profitability, ensuring safety, minimising environmental impacts, and doing so in ways that are accountable, transparent and agreed along the supply chain.

To begin this national discussion, we wanted to bring together people and organisations from across the food and fibre value chain for an interactive conversation. While we would have preferred a lengthy in-person meeting for such an important topic, COVID-19 restrictions meant an online gathering was best; in turn, the limitation of online meetings dictated we needed to condense our discussion into a relatively short time and involve a relatively small number of stakeholders.

As a result, two 90-minute online workshops were held on 16 and 17 June 2021. Attendance was by invitation from the organising committee. The meeting was fully subscribed with 38 participants over the two days from 50 people invited (18 people were on a waiting list) – a response rate that immediately suggests a high level of interest in this subject.

Day 1 aimed to establish if there is shared agreement: is this a problem worth solving, is this a goal that is supported, and what does success look like?

Most participants considered sustainable management of agripests to be important and suggested that it was a challenge to achieve their goals alone. Concerns about chemical resistance, recognising the need for more sustainability and market access were key themes of motivation for attending the workshop.

- Almost all participants rated the Agripest Challenge as a problem worth solving and a clear reason for doing so was a need to help industry deal with future challenges. Sustainability, and links between agriculture and consumers were also reasons. Participants felt that success in meeting the Agripest Challenge would include more control options strongly linked to sustainability. Chemicals were mentioned most often in two different contexts; a desire for more alternatives or to obtain more access to newer chemicals.
- It was difficult to reach consensus within and among groups on the importance of primary agripest sustainability goals, which were grouped into 7 themes based on feedback provided by participants before the workshop. Many participants also felt there was overlap of some of these initial 7 goals. As a result, the organising committee consolidated two consolidated goals for exploration on day 2:

  1. USE IT – Improved durable, effective and responsible agripest management strategies that are integrated and support optimal production

  2. PROVE IT – Demonstrate durable, effective and responsible agripest management to improve community and customer (domestic and export) confidence in Australia agriculture.

Day 2 aimed to explore how we get to a shared vision: the key collaborative processes, measures and actions that should be considered.

- Considering some objectives, actions and lines of evidence required to achieve these goals revealed a common need for strong collaboration across agricultural systems and throughout the supply chain. For instance, for both goals a requirement was articulated for education and awareness, and participants identified circumstances where programs were required across the supply chain, including with regulators and other supporting organisations.
- A need to build a system or pathway for collaboration (viz. sharing information, perspectives, resourcing, accountability) was also strongly articulated by participants as being essential to achieving Agripest Challenge. Many participants called for coordination and leadership to overcome difficulties in collaboration and identified the need for a plan that clearly articulates the scope, issues and priorities.

The workshop was the first step towards a national conversation about sustainable agripest control in agriculture. Although there was a clear call to action, one of the next steps will include follow up with individuals about specific issues to clarify the intent of some comments. We also will seek to engage with those who were not able to attend the meeting but expressed interest. In doing so we aim to clearly identify shared goals, a pathway forward, and the need for data and information (metrics) to establish baselines and track progress toward shared goals.

Part I A COLLABORATIVE WORKSHOP CAPTURING DIVERSITY THROUGH THE SUPPLY CHAIN

1 Methodology

The workshop was attended by invitation from the organising committee with an opportunity for other interested people and organisations to express their interest. We sought to include organisations across agriculture and across the supply chain from pre-farm suppliers through to retailers and consumers (Appendix 2). We approached more than 50 individuals, and had a high acceptance rate, with 38 attendees from industry over the two days and 20 people who were on a waiting list due to the meeting being fully subscribed.

We sought to include similar proportions of organisations from across the value chain, but there was an overrepresentation from those involved in research support and an underrepresentation from those that manufacture, supply or retail farm inputs and those that buy, manufacture, distribute or retail farm outputs. More participants had a plant-based rather than animal focus, and most participants were from eastern Australia (Figure 1). Future consultations will aim to correct this balance.

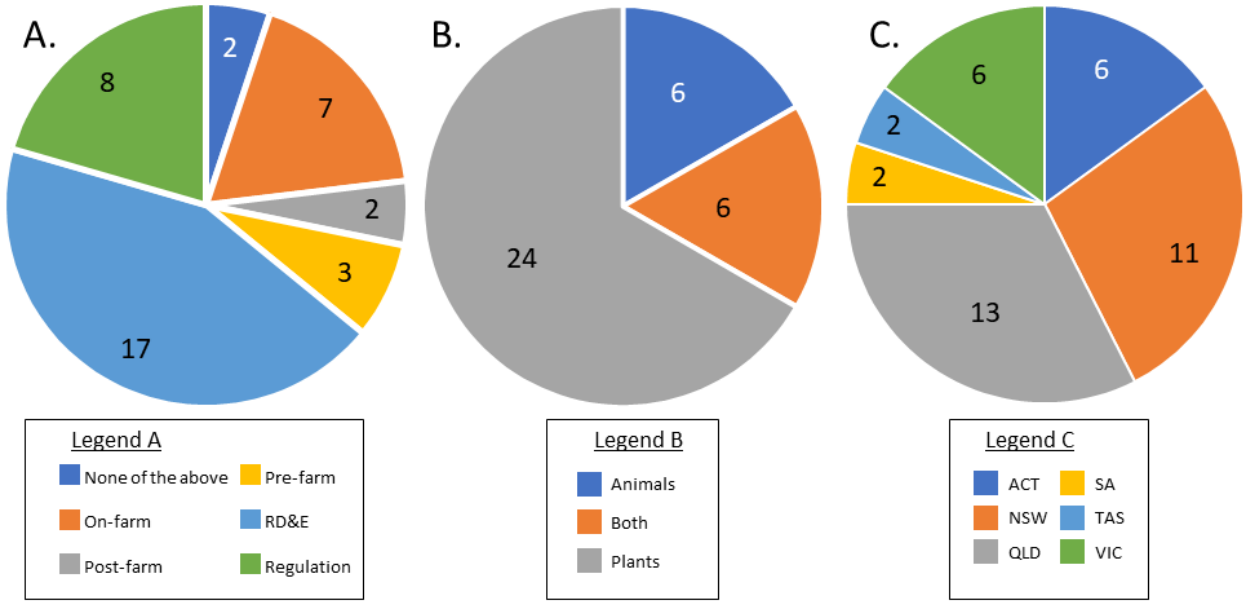


Figure 1 (A) The workshop participants were asked to nominate the main focus of their work (see definitions Appendix 3.3), (B) The workshop participants were asked to nominate which part of agriculture was their focus, and (C) The workshop participants were asked where they worked in Australia. Numbers on the graphs indicate the number of people who elected to be in the category.

The workshop constituted two video conference sessions on consecutive days. A facilitator helped organise the meeting and run the video conferencing functions including break out rooms and online polls. CSIRO staff presented some 'scene setting' information, the agenda and introductory slides are included in the appendix. There were two break-out sessions on each of the two days of between 5 and 8 people. On day 1 all the break-out groups considered the same questions, whereas on day 2 three groups considered one goal and the other three groups a second goal.

CSIRO note takers and facilitators in each break-out group were instructed to refrain from contributing their own opinions to the discussion as the focus was upon collecting the opinions of those from the various represented industries. The notes from break-out sessions were retained and analysed to form the principal parts of this report.

2 Day 1, Is there shared agreement?

Prior to the workshop, 35 participants responded to a questionnaire seeking their views on what sustainably managing weeds, pests and disease looks like. These responses were grouped by the committee into seven proto-goals which were the subject of day 1.

2.1 Exploring goals (Break-out session 1)

A poll was used to gauge opinions about the importance of agripest management to the attendees and opinions about how well participants thought agripest management goals were being achieved by themselves or their organisations (Figure 2). Together, these results indicate that agripest management is important to the majority (95% scored 6 or higher), whilst achievement of agripest management goals is challenging for most (71% scored 5 or lower).

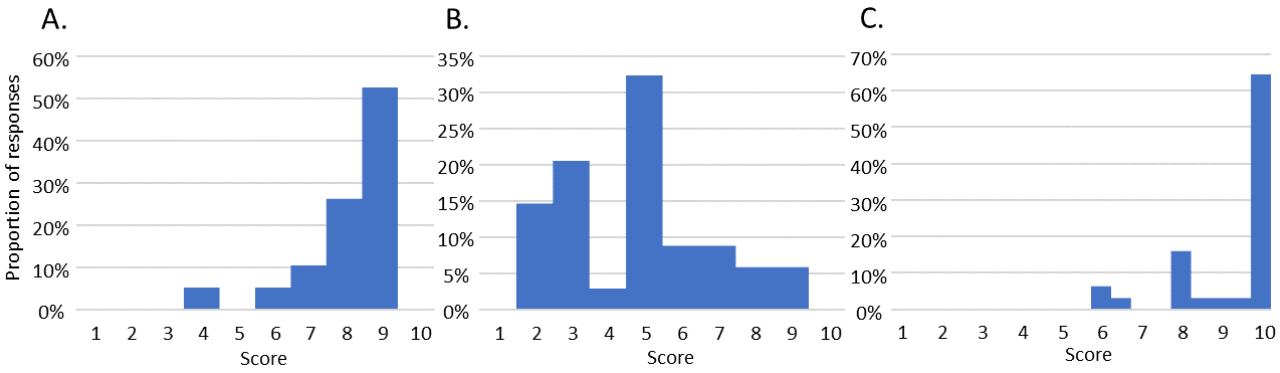


Figure 2 The workshop participants were asked (A) how important is the sustainable management of weeds, pests and diseases to you or your organisation? (B) how well they or their organisations are already achieving sustainable management of agripests, and (C) to what degree the Agripest Challenge was a problem worth solving for themselves or their organisation (n=31). The number of responses were 19 for A, 34 for B and 31 for C. (Scores 1 = Low, Score 10 = High). The y-axis represents the proportion of responses for all three graphs but note the differences in scale. Half scores were utilised for (C), so the columns are thinner.

The importance of solving the Agripest Challenge was scored uniformly high (Figure 3C), with the median score at 10. Some of the responders used a range of scores rather than one, in this case we used the mid point of the scores to create the graph. One responder ranked the importance in the near future as lower than for further into the future, which is an interesting perspective.

The need to help industry deal with future challenges was a clear message from the responses about how they scored the importance of Agripest Challenge (Table 1, Q2). Sustainability, and links between agriculture and consumers were also discussion points. The participants detailed what they believed a successful outcome of the Agripest Challenge might be (Table 1, Q3). The need for more options was the most prevalent sentiment expressed, strongly linked to sustainability. Chemicals were mentioned in a variety of contexts, the most frequent being either an expressed desire to have more alternatives to chemicals or a desire for greater access to more chemicals. This dichotomy will inevitably be part of the future national conversation about agripest control.

Table 1 During the first break-out session, attendees discussed these three questions. The number of responses were 35 for Q1, 28 for Q2 and 18 for Q3.

Q1 – Why was it important for you to attend today?	Q2 – To what degree is the Agripest Challenge a problem worth solving for you? And why?	Q3 – What might success look like for you?
Concerns about chemical resistance were common, as was a general recognition of the need for more sustainability. Market access for industry was another common theme.	The need to help industry deal with future challenges was a clear message from the responses about how they scored the importance of Agripest Challenge. Sustainability, and links between agriculture and consumers were also discussion points.	The need for more options was the most prevalent sentiment expressed, strongly linked to sustainability. Chemicals were mentioned in a variety of contexts, the most frequent being either an expressed desire for more alternatives to chemicals or a desire for more access to newer chemicals. This dichotomy will inevitably be part of the future national conversation about agripest control.
		

2.2 Evaluating goals (Break-out session 2)

Breakout groups were asked to score each of the seven goals that were developed based on the pre-workshop questionnaire to obtain an understanding of the level of interest in the goals.

Table 2 shows the goals and the combined scores that they attained across all participants in the workshop. As scoring may not have been undertaken in the same way in the different groups, we also show the proportion of people who gave the goal a score of 8 or above. These two methods align mostly, but neither could be used to rank all the goals.

Table 2 Goals identified from the pre-workshop survey and their ranking by workshop participants

Goals from pre-workshop survey		Combined rank	Participants ranking 8+ (%)
A	A diversified approach to pest management with reduced reliance on chemicals, informed by science	**1**	**68**
B	Active ingredients continue to be effective and resistance problems overcome	**4**	**57**
C	Align nationally/internationally with agripest management trends to remain competitive	**6**	**28**
D	Measurably reduce the environmental impact of pesticides and set sustainability targets	**5**	**28**
E	Pesticide use/availability that supports optimal production with minimal health/env impact	**4**	**60**
F	Public and consumer acceptance of agripest management tools and confidence in regulation	**3**	**50**
G	Sustaining production while meeting biosecurity and regulatory requirements	**2**	**65**

A summary of individual comments given by individuals on the goals is presented overleaf to give an indication of the diversity in opinion about each of them. Many comments reflected a belief that understanding of issues was not equally held across the supply chain, this was expressed by at least some people in most categories.

A *A diversified approach to pest management with reduced reliance on chemicals, informed by science.*

"If we get A right, the other pieces fall into place"
"Need to diversify so we can respond to challenges"
"Informs and facilitates the rest"
"A is what consumers want to see happen"
"Ultimately A is the goal"
"Diversified IPM (Integrated Pest Management) approach most important"

B *Active ingredients continue to be effective and resistance problems overcome.*

"Important because the cost of developing and registering new chemicals is high"
"In the short-term B is most important"
"Resistance issues are very important"
"Let's keep what we have working well"

C ***Engage*** *nationally/internationally with agripest management trends to remain competitive*

"Is most important because of the need to export Australian food"
"It depends what we're talking about"

Notes: There were very few comments registered about this goal. In one group there was a discussion about the need for the food industry to align with international trends. However, in terms of adoption of change of practice on farms the context in Australian farming systems is very different to other countries and the participants questioned the evidence/need for international alignment. There were divergent opinions. We decided to replace "***align***" with "***engage***" in response to points raised in these discussions

D *Measurably reduce the environmental impact of pesticides and set sustainability targets*

"Would be nice to measure but extremely difficult"
"Just put together sustainability framework"
"Balance between sustainable production and meeting regulatory pressure"
"Didn't agree with D"

E *Pesticide use/availability that supports optimal production with minimal health/environmental impact*

"Farmers need information to allow them to use chemicals correctly"
"Future proofing industry"
"Pesticide availability, pests and diseases are the highest limiting issue"
"Best output in terms of protein/ha"
"Didn't agree with E"

F *Public and consumer acceptance of agripest management tools and confidence in regulation*

"Without acceptance by public and consumers, options will be very limited"
"Educate consumers to have confidence in regulation"
"Important for trust"
"Consumers must be accepting of our products and solutions"
"If you can't sell the product to the grower or consumer the science doesn't matter"

G *Sustaining production while meeting biosecurity and regulatory requirements*

"Meets requirements of growers and emergent resistance"
"Meeting biosecurity is paramount"
"Working with farmers every day to maximise profitability"
"[Farmers] need to be proactive in how they manage all aspects of production, especially pest management. They can get addicted to a single method of control"

2.3 Synthesis of goals

No consensus was achieved on any one goal that was most important; every goal was nominated as important by at least one breakout group.

Clear feedback from participants was that seven goals were too many, goals relate to one another, and there was overlap between goals. As a result of this feedback, the organising committee worked after the meeting to group the goals into two overarching goals with working titles of USE IT and PROVE IT. Figure 3 illustrates how we believe the goals interact with each other, and the relationship of higher level 'outcomes' (E, G, F, C) and lower level 'objectives' within the overarching goals.

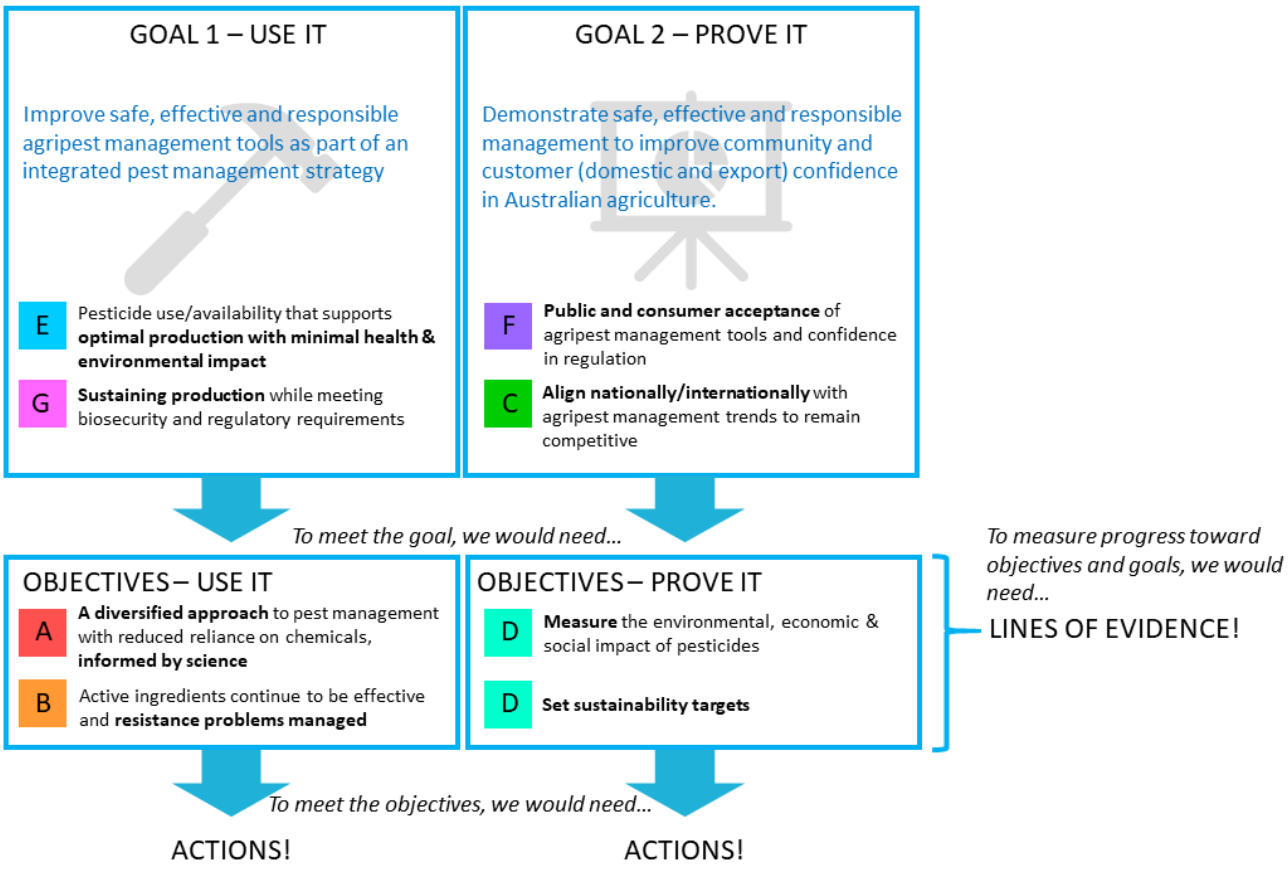


Figure 3 The USE IT and PROVE IT goals and how these relate to the proto goals discussed in the previous section. The figure also illustrates how actions and lines of evidence are required to meet objectives, achieve goals and have impact.

3 Day 2, How do we get to a shared vision?

On day 2 of the workshop, Break-out groups met to discuss possible actions which would need to be implemented to meet objectives and achieve the two identified umbrella goals ‘USE IT’ and ‘PROVE IT’. These were informed by challenges to achieving sustainable agripest control goals that were provided by participants before the workshop. Subsequently the groups considered the lines of evidence which would be needed to understand progress toward achieving goals and discussed what aspects would make these measures conducive to collaboration.

Participants were asked to focus on pathways rather than discussing the specific goals. In the following strategies, objectives 1 and 2 (original proto goals from Table 2) were pre-populated and objective 3 was created during discussion. Three groups considered each of the two goals, and we attempted to synthesize the information collected into the two impact pathway documents below.

Some common themes arose from these conversations, even between the two goals. One of these was a need for education and awareness, and participants identified circumstances where programs were required across the supply chain, including with regulators and other supporting organisations. As we further develop the Agripest Challenge plan, perhaps this area will become a third goal.

An action to assemble information and communicate it appropriately is clearly a part of the need identified. This is a complex task involving many organisations, so will need a significant amount of collaboration.

3.1 USE IT

Improve durable, effective and responsible agripest management strategies that are integrated and support optimal production.

POTENTIAL CHALLENGES IN MEETING THE GOAL: e.g.

- Need affordable better alternatives to old chemistries that fit to new diverse and complex farming systems.
- Lack of incentives and/or data on the economic viability of sustainable solutions may discourage their adoption.
- Lack of producer understanding/engagement/adoption, resistance to change, lack of stewardship programs.
- Cost: Market/Trade/financial implications**.**
- Registration of products/activities that are not compatible with sustainable practices/outdated framework.
- Recent incursions of new pests putting additional pressure on existing chemistry.
- Preconceptions, increasing distrust of science, government and corporations giving voice to alarmists.
- Collaboration across the supply chain.
- Australian market is very small.

OBJECTIVE 1: A diversified approach to pest management with reduced reliance on chemicals, informed by science.	**OBJECTIVE 2:** Active ingredients continue to be effective and resistance problems overcome.	**OBJECTIVE 3:** Farmer awareness and education.
ACTIONS - To meet this objective, we must: 1. Coordinate and collaborate across stakeholder groups. Establish networks, seek leadership and provide vehicles for productive communication. 2. Adopt and extend (understand broader reasons why farmers aren't adopting; providing greater extension support). Reach beyond the "usual suspects" to discover, understand and quantify barriers to adoption of training, techniques and products. 3. Bring regulators along but also create enabling environments for innovation. Use (1) to establish a productive multi-way communication between industry, research and regulation sectors. 4. Assess, benchmark and monitor public understanding and attitudes toward agripest management for ensuring supply of food and fibre, necessitating regulation of products and managing health and environmental risk.	**ACTIONS -** To meet this objective, we must: 1. Help inform businesses and organisations across the supply chain about resistance with a national, cross-industry information source. Link this to best practice information about managing resistance. 2. Develop standardized national resistance testing schemes where agreement on resistance detection/surveillance methodology is sought and improvements of methodology are developed together. 3. Conduct benchmarking exercises to establish current levels of resistance in priority agripests against key actives.	**ACTIONS -** To meet this objective, we must: 1. Benchmark achievement of best practice, compliance, and engagement with training. 2. Assess awareness of best practice, compliance obligations and training and identify gaps. 3. Where necessary develop new training systems to ensure (a) they remain up to date with new management options and (b) better access to, and engagement with training options.

MEASURES OF SUCCESS – The lines of evidence needed to measure progress are: 1. An agreed and consistent evaluation strategy for new agripest management products and systems, including those available overseas. 2. There were specific suggestions about benchmarking, farmer record keeping, audit, traceability schemes, recognition of good practise. 2.1 Incentives for adoption of best practice exist. 2.2 New products and systems tested for ease-of-use for farmers. 2.3 Benchmarking also applies to Australia vs other countries, and between industries within Australia. 2.4 Collection of key data at various points in the system. 3. Key data is collected to assess whether a diversified approach is being used for agripest management. Input from resistance surveillance (see objective 2), product registrations and sales, education and training access, adherence to compliance obligations and voluntary schemes (e.g. Chemclear).	**MEASURES OF SUCCESS –** The lines of evidence needed to measure progress are: 1. Development of resistance to chemical actives slowed relative to benchmark. 2. Information about resistance and services to monitor resistance easily accessible by users. 3. Services to monitor resistance exist across agripest types and industries which are affordable and easy to use.	**MEASURES OF SUCCESS –** The lines of evidence needed to measure progress are: 1. Producers/growers confident they have engaged with up-to-date training about agripest management. 2. Producers/growers adopt monitoring, objectively assess risk and take pride in progress against benchmarks. 3. Regulators and markets have a high level of confidence in Australian producers/growers.

What makes a line of evidence conducive to collaboration?

- Across agriculture collaboration will be needed. Most properties are not a single enterprise and lines of evidence will relate across enterprise mixes.
- Collaboration with agriculture input retailers will be needed. A missing element is the rural retail chains which have a huge influence into grower decisions, and capacity to influence product choices. They are front and centre in diagnostic technology, products and end users. They may be making decisions that are not based on the principles we've been talking about. (Organiser's note – one retailer business was represented, but assigned to PROVE IT)
- Need to build a system or pathway for collaboration. Currently this does not formally exist. It's done by relationship, knowledge, and marketing - the fact that a lot of us know each other. Collaboration works best when you're trying to solve a problem - so need to have a mechanism to identify the problem. If you don't have that [problem], it's hard to collaborate, it's hard to have the line of evidence, the definition of success and know where we're heading.

3.2 PROVE IT

Demonstrate durable, effective and responsible agripest management to improve community and customer (domestic and export) confidence in Australian agriculture.

POTENTIAL CHALLENGES IN MEETING THE GOAL: e.g.

- Increasing distrust of science, government and corporations giving voice to alarmists. A lack of understanding of the role of pest and disease management in the production of food and fibre distorts many public discourses.
- Challenges presented by our unique environmental conditions, strict biosecurity and market size.
- Addressing the needs of all groups involved in agripest management - producers, suppliers, advisors, markets and consumers, to understand the areas that are non-negotiable and those that are the flexible items.
- Lack of agreement about best practice and associated measurement.
- Lack of timely access to open access datasets.

OBJECTIVE 1: Measure the environmental, economic and social impact of pesticides.	**OBJECTIVE 2:** Set sustainability targets.	**OBJECTIVE 3:** Measuring public perceptions of environmental sustainability and education about agripest management from farmers to consumers.
ACTIONS - To meet this objective, we must: 1. Understanding, re-evaluation, communicating and feedback about existing data. 2. Map pathways of pesticide use and outcomes. 3. Develop new open and transparent surveillance and monitoring systems: 3.1 Quantify applicator's knowledge and skills. (e.g. level of best practice). 3.2 Measure resistance levels in target organisms nationally, cross-industry and linked to biosecurity system. 3.3 Establish baselines. 3.4 Collate data and integrate with production system.	**ACTIONS -** To meet this objective, we must: 1. Communicate with industries to establish cohesive/harmonised priorities and targets.	**ACTIONS -** To meet this objective, we must: 1. Understand perceptions and need for reassurance. 2. Understand what information sharing/educational methodology will inform and reassure.

MEASURES OF SUCCESS – The lines of evidence needed to measure progress are: 1. Impact of weeds, pests and diseases in agriculture reducing over time. 2. Market access for agricultural products not impeded by agrichemical use patterns or stewardship. 3. Industries are resilient and can adapt to biological and market threats.	**MEASURES OF SUCCESS –** The lines of evidence needed to measure progress are: 1. Benchmarking the system against agreed criteria: • current practices • weed, pest and disease impacts • OHS outcomes (chemical use) • environmental outcomes 2. Established methods for monitoring and surveillance system to track progress against benchmarks. 3. Established funding system for monitoring and surveillance system to track progress against benchmarks. 4. Established communication channels and education about our systems for monitoring and surveillance and the observed progress against benchmarks.	**MEASURES OF SUCCESS –** The lines of evidence needed to measure progress are: 1. Industries are pro-active, presenting evidence of best practice, stewardship and compliance to their customers, consumers and policy makers. 2. Industries are proactive about planning ahead for future threats and responding with investment in research, changes to policy, education programs and engagement across industries and supply chains.
What makes a line of evidence conducive to collaboration? ○ Sharing costs, sharing data (inputs, outputs/impacts/indicators/outcomes, links to best management practices). Shared benefits ○ Cross-industry programs e.g. resistance management ○ Grower/Producer Extension programs		

4 Post Workshop

4.1 Exit Polls

Participants were asked three questions to inform future actions and areas of focus. Below we collate the responses under headings which represent broad themes and list the actual responses underneath (Figures 4, 5 & 6). At the bottom of each box we list the supply chain categories of participants who supplied the responses.

Figure 4 Participants were asked what topic they would choose for a future workshop.

The workshop participants provided three types of responses to the question about a topic for future workshops (Figure 4). First were calls for further defining the issue, secondly simple calls to action and thirdly more detailed progress against three goals, USE IT, PROVE IT and more generally about collaboration. For future engagement, the needs of those requiring further definition will need to be balanced against the desires of others for more immediate action.

We also asked participants what they thought was missing from the workshop (Figure 5). Defining the issues was again a response from members of the pre-farm, R,D&E and regulators groups. Broader engagement was a common response for all groups except regulators, and when combined with specifically engagement with producers/growers this was the largest category of responses. Issues to do with funding and regulatory systems comprised two smaller groups of responses and there were also four comments specifically about the approaches that might be used.

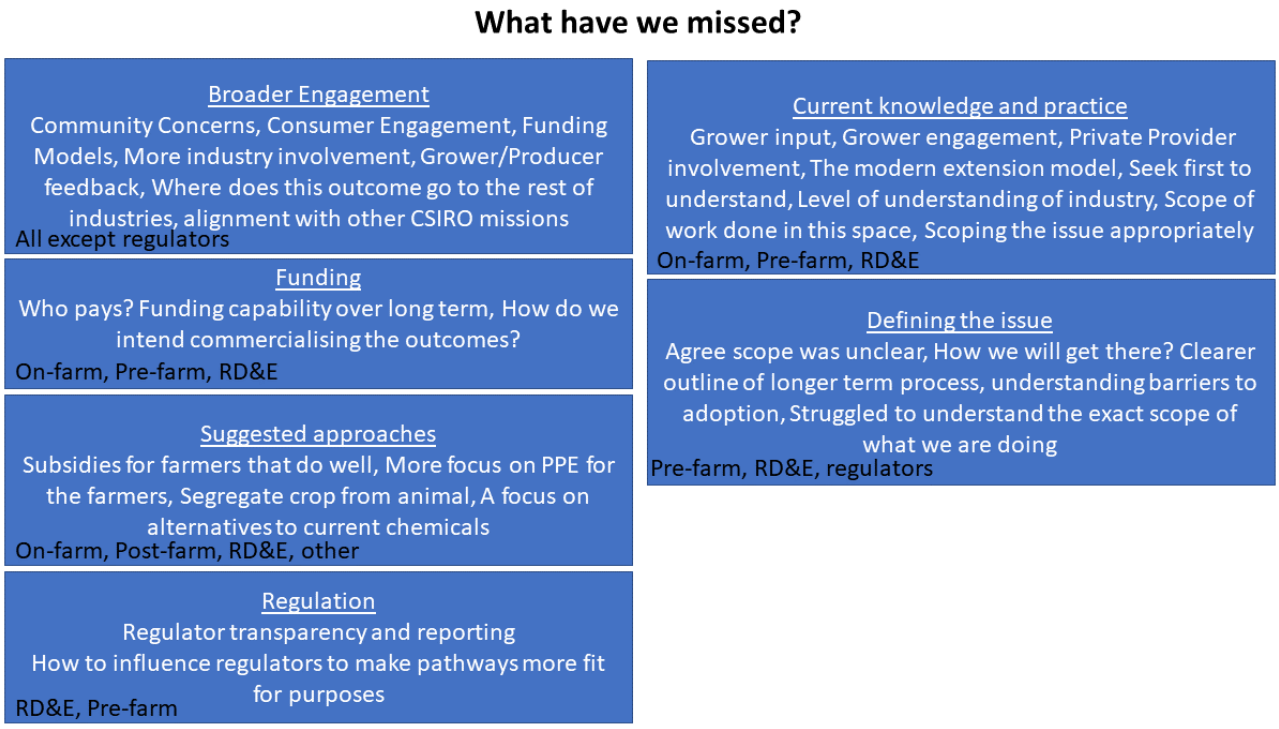


Figure 5 Participants were asked what was missing from the workshop.

The final question asked of participants was about the barriers to success that they envisaged (Figure 6). Overwhelmingly, a lack of collaboration and understanding was the most mentioned barrier. The need for a good plan that achieves funding and can address apathy was another clear message.

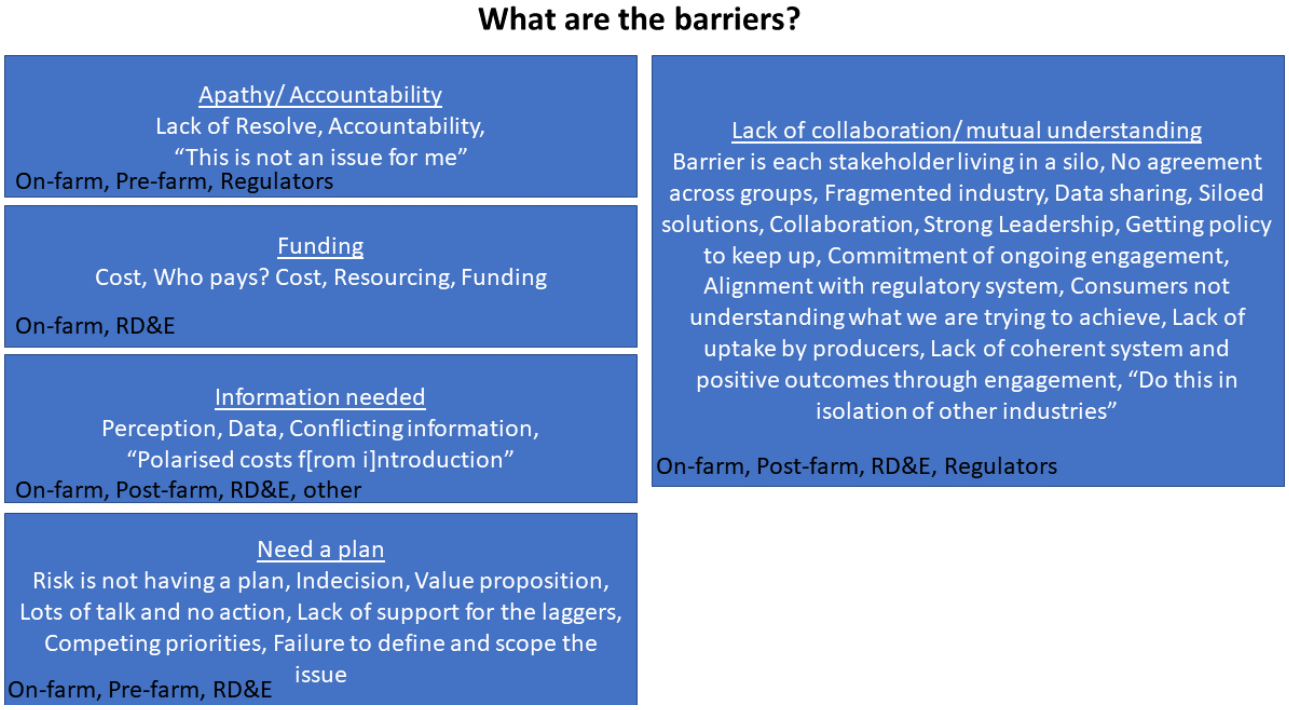


Figure 6 Participants were asked what barriers they thought might impede success.

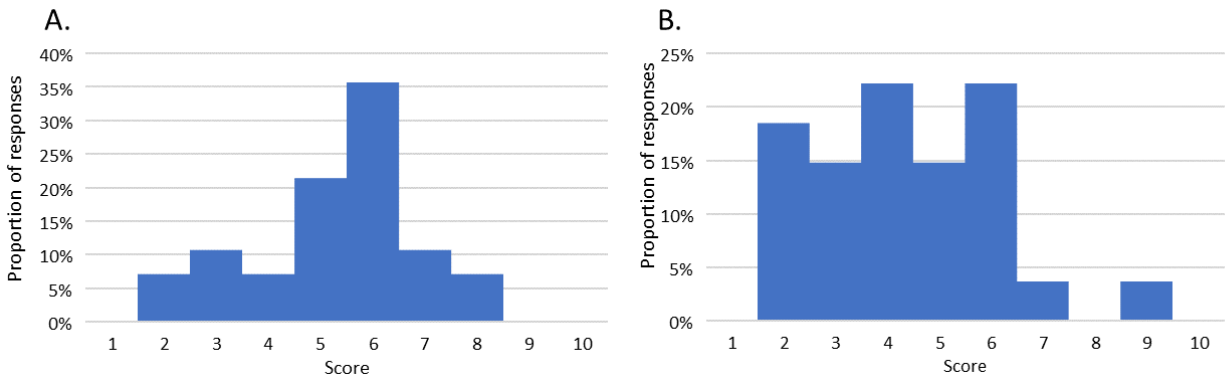


Figure 7 Participants were asked "Overall, how useful did you find this workshop?" (A), and "What is your sense of the likelihood of success?" (B). There were 28 respondents to the first question and 27 for the second.

We asked two workshop evaluation questions (Figure 7). On the usefulness of the workshop, 75% of respondents scored the workshop 5 or higher, but the likelihood of success was more divided, with only 44% respondents scoring the likelihood at 5 or higher. Comparing these results back to the polls conducted at the start of the workshop, there is clearly a great desire for success and a perception of need, but there is also pessimism about the prospects for change; confidence will need to be forged as part of the ongoing work by engaging with stakeholders and pursuing real progress.

4.2 Where to from here?

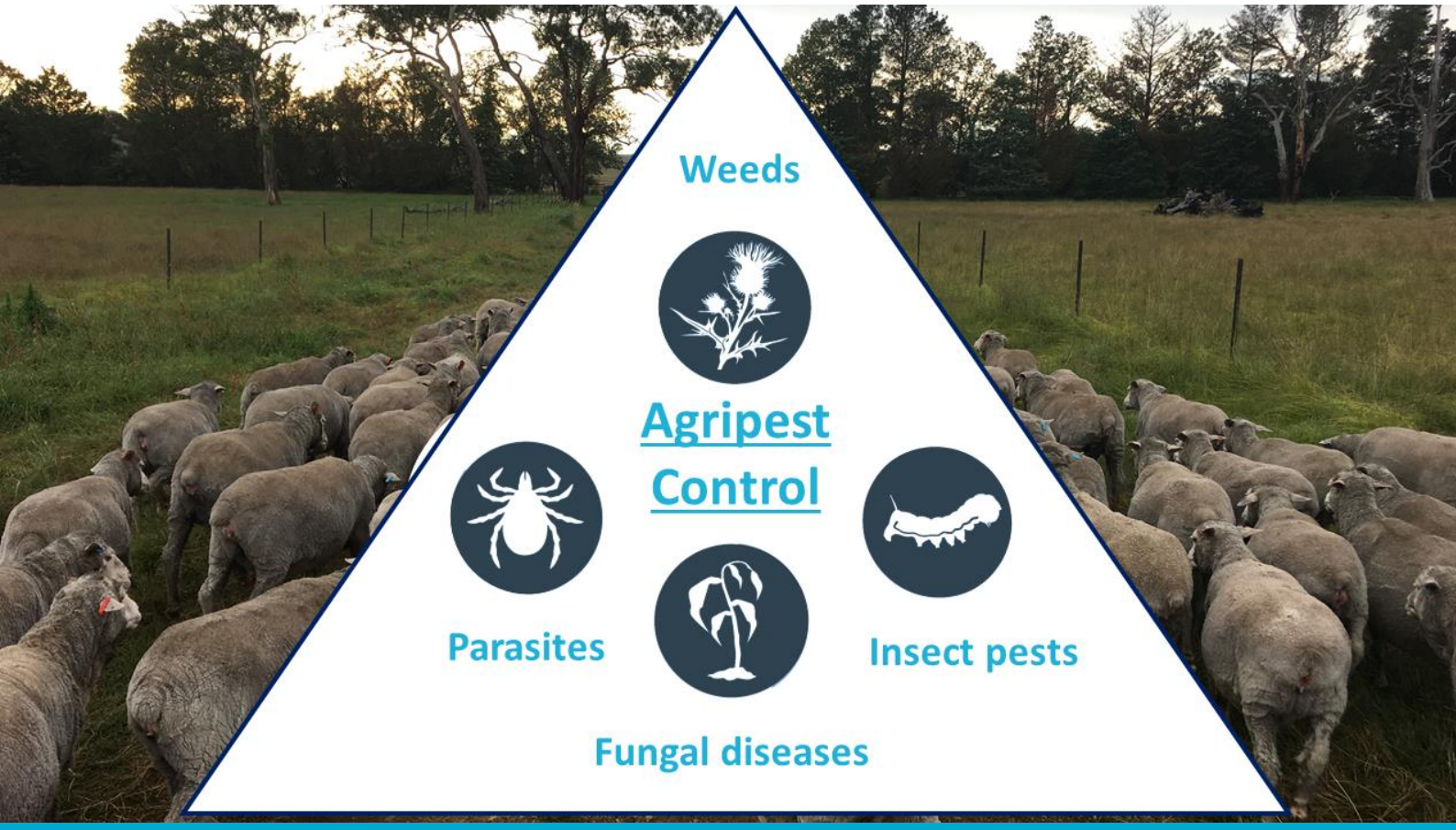
This information will be used as part of the next steps in engaging with industry, government, and the community about Agripest Challenge to further articulate the alignment of priorities across the supply chain. We note that for some of the insights on omissions, significant bodies of work exist or are underway particularly around current knowledge and practise. We will share more information on this work as we move forward, some material for future discussion is presented in Appendix 3 and in some of the listed references.

We note an overwhelming desire for further collaboration, enhancing mutual understanding and communication across most participants. Overcoming barriers to achieving this is a priority. The other barriers identified are also very important and will underlie our ability to tackle the issue of collaboration communication.

The workshop was the first step towards a national conversation about sustainable agripest control in agriculture. Although there was a clear call to action, the next steps include follow up with individuals and organisations about specific issues to clarify the intent of some comments. We will also engage with others who were not able to attend the workshop. Further workshops are one of the possible outcomes of this continuing engagement.

There is a clear prerogative to clearly identify shared goals, a pathway forward, and the need for data and information (metrics) to establish baselines and track progress. You can't change what you can't measure, and these metrics will be necessary for progress toward shared goals.

Appendices


Weeds
Agripest Control
Parasites
Insect pests
Fungal diseases

1 Workshop Agenda

Day 1

Minutes	Topic	Who
10:30 am AEST	Welcome from CSIRO and housekeeping	Jen Taylor
	What is Agripest Challenge?	Sharon Downes
	Workshop conduct and overview	John James
10:40	Poll questions Q1 *Where are you located [QLD/NSW/VIC/ACT/TAS/SA/NT/WA]?* Q2 *In which sector do you work? [Pre-farm, On-farm, Post-farm, Regulators, RD&E, other]* Q3 *In which part of agriculture do you most work [Crops, Livestock, Both]* Q4 *How important is the sustainable management of pests, weeds and diseases to you (or your organisation)? 1 (low) to 10 (high)* Q5 *How confident are you that you (or your organisation) are already achieving that on your own? 1 (low) to 10 (high)*	John James
	Break-out session 1 For you and your organisation Q1 *Why was it important for you to attend today?* Q2 *To what degree is the Agripest challenge a problem worth solving for you? 1 (low) to 10 (high). Why (in one phrase)?* Q3 *What might success look like for you (one phrase)?*	CSIRO Facilitators & Notetakers
	Feedback from groups	CSIRO Reporters
	Insights from pre-meeting survey questions (proto goals)	Hazel Parry
11:15 am	Break-out session 2 *For each of the proto goals* Q1 *Individually rate the goals on a scale of 1 (low) to 10 (high), according to their importance to you (or your organisation).* Q2 *What were your top goals?* Q3 *What are the most challenging goals to achieve?* Q4 *What goals will benefit most if we work together?*	CSIRO Facilitators & Notetakers
	Feedback from groups	CSIRO Reporters
12:25 pm	Recap of day 1 and plan for day 2	Peter Hunt

Day 2

Minutes	Topic	Who
10:30 am AEST	Welcome and workshop overview. Introduce one page strategy document	John James
	Recap of Day 1 - 2 "synthesised" goals	Peter Hunt
10:40 am	Break-out session 1 Objectives and actions: what steps do we need to take to succeed? *For the nominated goal* Q1 *What do we need to do to achieve success (objectives)? (e.g., improved vendors declarations for products)* Q2 *What actions do we need to take to achieve it? (e.g., automated on farm systems to capture information that can be e-delivered to others along the supply chain)* Q3 *What are the opportunities or challenges for collaboration?*	CSIRO Facilitators & Notetakers
	Feedback from groups	CSIRO Reporters
11:10 am	Break-out session 2 Measures of success: How will we know when we have achieved our goal? *For the nominated goal* Q1 *What lines of evidence do we need to measure success?* Q2 *What lines of evidence should we be collecting that we are not?* Q3 *What are the opportunities or challenges around collaboration?*	CSIRO Facilitators & Notetakers
	Feedback from groups	CSIRO Reporters
12:15 pm	Poll questions Q1 *What have we missed?* Q2 *If we were to have another workshop, what would you like it to focus on?* Q3 Overall, how useful did you find this workshop, on a scale of 1 (low) to 10 (high)? Q4 What is your sense of the likelihood of success, on a scale of 1 (low) to 10 (high)? Q5 *What is the biggest risk or barrier going forward?*	John James
	Wrap up and next steps	Sharon Downes

2 Participants and apologies

Pre-farm

Adama Australia
Innovate Ag
Nufarm Australia
Nutrien Ag Solutions
Recubed
Syngenta Australia
Virbac Australia
Zoetis Australia

On-farm

Aerial Application Association of Australia
Cotton Australia
Crop Consultants Australia
Dawbuts
Moolabah Agriculture

Post-farm

Carman's Kitchen
Kellogg's Australia
McMullen Consulting
PepsiCo Australia and New Zealand

Regulation

Australian Pesticides and Veterinary Medicines Authority
Department of Agriculture Water and Environment Commonwealth of Australia
NSW Environment Protection Authority

Research, Development & Education

Agriculture Victoria
Australian Wool Innovation
Cotton Research & Development Corporation
The Commonwealth Science and Industrial Research Organisation
Department of Agriculture and Fisheries Queensland
Grains Research and Development Corporation
Hort Innovation
James Cook University
Meat and Livestock Australia
Plant Biotechnology Research Institute
Primary Industries Research South Australia
Sugar Research Australia
The Australian Wine Research Institute

The following expressed interest in attending, but were either unavailable or were not able to be included due to workshop size limitations

AgSafe Australia
Australian Chicken Meat Federation
Birchip Cropping Group
CropLife Australia
Elders Rural Services
Grain Producers
JBS Foods Australia
National Farmer's Federation
New South Wales Department of Primary Industries
Organic Crop Protectants

Other organisations contacted were Animal Health Australia, Australian Eggs and the National Residue Survey

3 Introductory information

3.1 Meeting invitation

Invitation to contribute to Agripest Challenge Workshops 16/17 June 2021
Agripest Challenge is a new national collaboration led by CSIRO to transform how we sustainably manage weeds, pests and diseases.

Workshop dates: 16th and 17th June 2021.
Workshop times: 10.30am-12pm AEST on both days.
Workshop location: Zoom video conference. Each participant to dial in on separate device.
How to get involved: We welcome a broad participation in the conversations leading up to, and subsequent to the workshop. Although the public workshop is by invitation only we welcome expressions of interest for participation. Please contact as below before 5th June.
RSVP: 5th June 2021.
Contact: Dr Peter Hunt (peter.hunt@csiro.au), Dr Sharon Downes (sharon.downes@csiro.au), Dr Nicola Cottee (Nicola.Cottee@epa.nsw.gov.au), Ms Susan Maas (Susan.Maas@crdc.com.au), Mr Chris Cosgrove (chris@sustenanceasia.com).

The opportunity: We are bringing together people and organisations involved in animal health and crop protection to ask if and how we can collaborate to identify shared goals and metrics for the sustainability of agripest management in food and fibre production. We would like you to be involved in this collaborative process by attending two scoping workshops.

The challenge: Throughout the food and fibre supply chain, participants require assurance that agripest control has been conducted in ways safe for people and the environment. Producers face restricted access to chemicals driven by regulations, market access, customer requirements and resistance. At the same time, novel agripest management options are being introduced. In this changing production system, there is a challenge of maintaining communication and trust about the sustainability of agripest control methods.

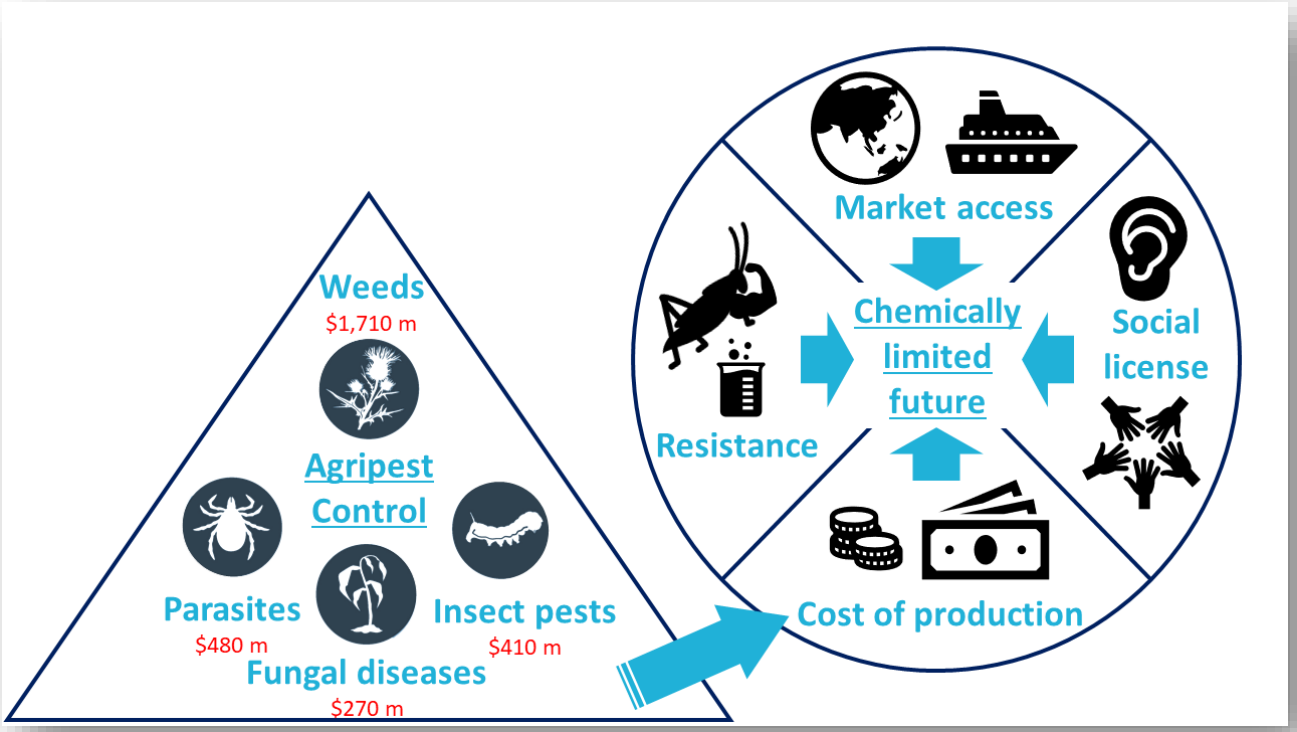
The vision: Avoid a future risk of failing to control agricultural weeds, pests and diseases while maximising profitability, ensuring safety, minimising environmental impacts, and doing so in ways that are accountable, transparent and agreed along the supply chain.

The approach: Day 1 of the workshop aims to establish if there is shared agreement: is this a problem worth solving, is this a goal that is supported, and what does success look like? Day 2 of the workshop aims to explore how we get to a shared vision: the key collaborative processes, measures and actions that should be considered.

The outcome of these workshops will be to initiate a national conversation about sustainable weed, pest and disease control in agriculture. We aim to clearly identify shared goals, a pathway forward, and the need for data and information (metrics) to establish baselines and track progress. You can't change what you can't measure, and these metrics will be necessary for progress toward shared goals.

Disclosure and ownership: These workshops seek to involve the participants in decision making and the reporting is full disclosure, without attribution of who said what. The process is one of co-design or co-innovation, where the participants have equal ownership of the outcome and process.

3.2 Introductory presentation



Slide 1 We all know that to remain viable, Australian agriculture needs to minimise the costs of production relative to income. The figures on this slide from 2017/18 reinforce that management of agripests using chemicals is a substantial cost, even before factoring in the expense of applying them.

We also know that Agripests develop resistance to agrichemicals and these become less useful with time. This is increasing for many key scenarios and has occurred repeatedly worldwide, which means that new agripests are landing in Australia having been selected for resistance elsewhere. Markets are becoming more sophisticated and can demand the limited use of certain technologies during and post production. Consumers are becoming more empowered – their actions can limit options, their perceptions are not always driven by objective facts, and social license has to be earned and then maintained. When considered together, these forces are driving a chemically limited future for agripest control.

Going forward it will be necessary to better use existing chemicals, introduce alternative technologies, and redesign farming systems so that they're less vulnerable to attack. It will also be necessary to work together across industries and throughout the supply chain to co-develop strategic whole of system solutions. In this changing production system, there will be a challenge of maintaining communication and trust about the sustainability of agripest control methods.

Slide 2 This slide shows a pictorial representation of what we think it might look like to seize this opportunity. Avoiding a future risk of failing to control agripests while at the same time maximising profitability, ensuring safety, minimising environmental impacts, and doing so in ways that are accountable, transparent and agreed along the supply chain is what we refer to as the Agripest Challenge.

Elsewhere in the world cohesive 'top down' governmental initiatives are in place that specifically target substantial reductions in the use and risk of chemicals for agripest control. In Australia, we currently don't have similar initiatives at a national level to prepare our agricultural industries for a chemically limited future. As a result, organisations are looking to set their own sustainability goals.

We see an opportunity to strategically collect data that will provide evidence of progress and to improve the measures available in Australia for monitoring agrichemicals that would better capture the nuance and complexity of their use. To get the most value from this approach the capture of data and it's use would be aligned among sectors and states to deliver a codeveloped strategic national approach.

And to do this will require agreement and cooperation from across the value chain, from producers to consumers, policy makers and scientists, and agribusiness retailers, to rethink the fundamental strategy behind the sustainable control of agripests.

Can Australian agriculture achieve durable agripest control in this future?

Can we co-develop goals and partner to efficiently measure progress toward them?

We think there's a lot to be gained by responding to the opportunity as a national effort that is sustained over time as agripest management practices adapt to a chemically limited future.

3.3 Definitions

For this workshop we invited attendees from different parts of the agriculture supply chain:

Pre-farm — Manufacturers, distributors and retailers of farm input commodities with a focus on agrichemicals.

On-farm — Those who work within agricultural enterprises such as producers. Consultants, organisations and contractors who support agricultural enterprises.

Post-farm — Industries which receive produce from agriculture such as distributors, manufacturers, and retailers of food and textiles.

RD&E — Research, Development and Education organisations, these were mostly Research and Development Corporations (RDCs) and educators.

Regulators — Organisations who support the system through regulation of agrichemicals in Australia.

Some other definitions that were not presented at the workshop. We deliberately did not include them, as the opinions of the attendees were more important to us than definitions. We include these here to allow attendees to consider the definitions that CSIRO is using in preparation for future continuing engagement.

Agriculture — We mean this in the widest sense, and it includes extensive and intensive cropping and livestock rearing, perennial and annual crops, horticulture, aquaculture and silviculture.

Agripests — We mean all organisms that can impinge on agricultural production including weeds, pests and disease organisms. These occur across all the major groups of organisms, animals, fungi, plants, protozoa and bacteria.

Agri-chemicals

We mean all pure chemical products used for agripest management. This includes agricultural chemicals and veterinary pharmaceuticals such as herbicides, antibiotics, fungicides, insecticides, anthelmintics, anti-parasitics, vertebrate poisons and others. These may be formulated with non-chemical substances to create products, in which case we mean just the chemical component. For the purpose of Agripest Challenge we do not consider chemical agents developed for purposes other than agripest management (e.g. products for floral initiation, fertilizers, nutritive supplements, analgesics, sedatives, hormones).

Alternatives Other means by which agripest management can be achieved. This can include:

Products such as vaccines, complex biological extracts or living organisms which contain more complex active components compared to pure chemicals.

Processes by which crops or livestock are made resistant or resilient to the effects of agripests such as immunostimulation, nutrition, irrigation, breeding strategies or transgenic approaches.

Manipulation of the agricultural system to limit exposure to agripest threats, for example alterations to the timing of sowing or harvesting, duration or pattern of grazing, the environment using animal housing or glasshouses, timing of the reproductive cycle for perennial crops (through variety choice) or livestock, crop rotations and many other strategies.

National or regional systems which can affect agripest threats such as quarantine zones, release of enduring biological control agents, sterile release strategies (e.g. as used for screw worm fly), collective actions such as industry programs for eradication (e.g. Brucellosis).

Reliance on chemicals

This phrase arose from industry liaison during the early phases of developing Agripest Challenge. We understand it to mean the situation where chemicals become the only means of managing an agripest, and the fewer chemical actives available, the higher the level of risk associated with the reliance. In such a circumstance a regulatory, market or resistance status change will lead to great difficulties in managing this particular agripest. From a risk management perspective, such a situation is perilous, and an attempt to broaden the number of agripest management possibilities is imperative.

Sustainability

The ability to be maintained at a certain rate or level (Dictionary definition). The word is intended to be used with others to create a context.

For agriculture we believe this means the ability to continue to produce food and fibre for consumption by industry and the community. A number of things will underlie the ability to continue (1) farms will need to be profitable for people to be willing to operate them, (2) markets for products will need to remain accessible for the production of any particular commodity to remain profitable, (3) environmental services which underpin production systems will need to continue for production to occur, (4) governments and in democratic countries the community, will need to continue to endorse the activity for it to be allowed to continue (this is about regulation and social license), (5) the costs of production must remain below the income gained from that production for a profitable outcome, increases in costs due to an inability to control agripests will impinge on profitability or in the worst cases negate it (agri-chemical resistance and the imperative to have cost effective agripest management strategies).

References

For more information about CSIRO's Agripest Challenge:

https://www.csiro.au/en/research/plants/crops/Farming-practices/Sustainable-weed-pest-and-disease-control

CSIRO authors have published a series of articles in the popular science magazine ECOS. These discuss a range of issues connected to the Agripest Challenge. These can be accessed via the internet at:

https://ecos.csiro.au/category/2021/issue-278-sustainable-agriculture/

CSIRO also considers planning for the future of agriculture:

https://www.csiro.au/en/work-with-us/services/consultancy-strategic-advice-services/CSIRO-futures/Futures-reports/Food-and-Agribusiness-Roadmap

There has been a recent Independent review of the agvet chemicals regulatory system, sponsored by the Commonwealth department of agriculture, water and the environment. Along with the final report, there are multiple position papers and feedback submissions from people across the agvet chemicals sector. This may be interesting reading for those interested in this workshop report. These can be accessed via the internet at:

https://haveyoursay.awe.gov.au/agvet-chemicals-regulatory-reform

The New South Wales Environmental Protection Authority's website is:

https://www.epa.nsw.gov.au/

The Cotton Research and Development Corporation's website is:

https://www.crdc.com.au/

Agrifutures Australia report "Community trust in Australia's rural industries – A national survey 2020"

https://voconiq.com/wp-content/uploads/2020/08/CTiRI_A-national-survey_2020_woutMark.pdf