

FINAL REPORT

DAQ00179

IPM Training

PROJECT DETAILS

PROJECT CODE: DAQ00179

PROJECT TITLE: IPM TRAINING

START DATE: 01.07.2012

END DATE: 30.06.2015

SUPERVISOR: MELINA MILES

ORGANISATION: DEPARTMENT OF AGRICULTURE AND FISHERIES

CONTACT NAME: MELINA MILES

Summary

The Australian grains industry faces a number of challenges in terms of invertebrate pest management. There is a very high reliance on insecticides, particularly broad-spectrum insecticides, for the control of pests. This reliance brings with it significant risks to individual growers and to the industry more broadly. This project has developed and delivered workshops across the GRDC Southern and Northern regions exposing growers and agronomists to fundamental tools and knowledge necessary to implement integrated pest management (IPM), while challenging their current practices. Post project results showed 95% of participants had implemented something they had learnt at the workshop within two years.

Report Disclaimer

This document has been prepared in good faith on the basis of information available at the date of publication without any independent verification. Grains Research & Development Corporation (GRDC) does not guarantee or warrant the accuracy, reliability, completeness or currency of the information in this publication nor its usefulness in achieving any purpose. Readers are responsible for assessing the relevance and accuracy of the content of this publication. GRDC will not be liable for any loss, damage, cost or expense incurred or arising by reason of any person using or relying on information in this publication. Products may be identified by proprietary or trade names to help readers identify particular types of products but this is not, and is not intended to be, an endorsement or recommendation of any product or manufacturer referred to. Other products may perform as well or better than those specifically referred to. Check www.apvma.gov.au and select product registrations listed in PUBCRIS for current information relating to product registration.

Copyright

Grains Research and Development Corporation. This publication is copyright. Apart from any use as permitted under the Copyright Act 1968, no part may be reproduced in any form without written permission from the GRDC.

Old or Archival Reports (Projects that concluded in 2007 or earlier)

The information contained in these older reports is now several years old, and may have been wholly or partially superseded or built upon in subsequent work funded by GRDC or others. Readers should be aware that more recent research may be more useful for their needs. Findings related to agricultural chemical use are also potentially out of date and are not to be taken as a recommendation for their use.

Conclusions

Project impact and outcomes

The final project evaluation shows the workshops had a significant impact on knowledge, attitude and practice of the growers and agronomists who participated.

Changes in attitude and practice

Significant change in attitude and/or practice was reported in relation to:

- 1) Increased use of thresholds.
- 2) Improved pest monitoring (includes attention to identification).
- 3) Scouting for beneficials and consideration for their contribution to pest control.
- 4) Use of selective insecticides.
- 5) Use of cultural control techniques.
- 6) Planning invertebrate pest management.

The incorporation of these components into invertebrate pest management practice is consistent with progress towards the implementation of an IPM strategy.

In addition to changes in attitude, 95% of workshop participants surveyed said they were applying something they had learnt in the workshop. Had they not participated in the workshops, 70% of those surveyed said they would have not made the changes, while 22% said they would have taken longer to make the change.

The fact one-off workshops can have such significant impacts on participants is a resounding endorsement of the effort and expertise of the project team in developing and delivering workshops with such high impact.

Extrapolating data from agronomist responses to questions about the impact of their practice change on the proportion of their clients, it was estimated that least 2,000 growers may benefit from the participation of 280 agronomists in the workshops.

Barriers to IPM adoption are many, but not insurmountable

The major barriers to the changing practice in the field were:

- 1) An absence of planning and a reactive approach to pest management.

- 2) Time constraints affecting the ability to monitor adequately and be flexible with treatments.
- 3) A lack of knowledge and experience with alternate approaches to pest management.

The dominance of sales agronomists in some regions is likely to play a significant part in exacerbating some of the barriers. The high client to agronomist ratio, sales pressures and on-demand farm visits all serve to undermine the potential to implement changes to pest management practice.

However, at every workshop participants were able to make a list of knowledge and information gaps that they felt would assist them greatly in having the confidence to change. With investment, the majority of these needs can be met.

Growers as the gatekeepers for IPM adoption

While growers clearly rely heavily on agronomists for advice on pest management, the grower's role in facilitating IPM adoption is more complex than just leaving the decision-making on invertebrate pests to their agronomist. Ultimately, the grower is the decision maker and determines the level of risk and expenditure with which they are comfortable. There may be a significant difference in the grower's perceptions of risk and that of the more informed and experienced agronomist. This disconnect contributes to several of the barriers to IPM identified by workshop participants.

Recommendations

In the final evaluation, there was overwhelming support for similar workshops, incorporating new research results (refreshers) to be rolled out every 2-3 years.

To meet this expectation of refreshers, packed with new research outcomes that will fill existing gaps in knowledge, there must be investment in locally relevant research and extension.

The workshop modules provide an excellent basis for any future IPM education program in the grains industry.

The engagement of growers needs careful consideration, as they are ultimately the gatekeepers or drivers of change in practice.

Outcomes

Economic Outcomes

While not directly measured, changes in grower and agronomist awareness of pest lifecycles, drivers of outbreaks and economic thresholds will potentially increase the likelihood that invertebrate pests are controlled, before they cause yield or quality loss. Greater understanding of the risks of insecticide resistance and its management will increase the longevity of existing chemistry, and reduce the likelihood of ineffective insecticide treatments. It is estimated that the impact of changes in attitude and practices of participating agronomists has affected at least 2,000 growers to October 2015.

Environmental Outcomes

As a result of the project activities, there is evidence of significant change in the attitude of participants towards improving pest management practices. Key changes identified with direct and flow-on benefits to the environment are:

- 1) The use of selective rather than broad-spectrum insecticides.
- 2) Use of thresholds to underpin decisions that potentially reduces the number of unnecessary sprays.
- 3) Interest in preserving beneficial insects (predators and parasitoids), which will also preserve other non-target species in the agricultural landscape.

Social Outcomes

This project has provided the opportunity for an entomologist working in the grains industry to work collaboratively to develop skills in the design and delivery of invertebrate pest management education. Considerable capacity has been built through this process, providing a platform for future grower and agronomist education.

Achievements/Benefits

The objective of this project was to increase the knowledge, skills and capacity of growers and agronomists to implement IPM

on their farms.

The project was designed to achieve these outcomes through :

- 1) Development of workshop modules and supporting resources.
- 2) Design and delivery of 26 facilitated workshops for growers and advisers, using a team of experienced field entomologists.
- 3) Provision of ongoing learning opportunities for workshop participants through follow up field components.
- 4) Evaluation of the preferences of workshop participants in relation to supporting technology (apps and decision support tools).

Key indicators of success were identified as:

- 1) More targeted spraying.
- 2) Increased monitoring of pests and beneficials.
- 3) Increased understanding of the relationship between pests, beneficials and the impact of spraying.
- 4) Changes in management practices.

Project methodology

A pilot workshop was held in the first six months of the project to test the content and design. Feedback was used to redesign the workshops for roll out across Queensland, New South Wales (NSW), Victoria (VIC) and South Australia (SA). Grower participation was considerably lower than expected (18%), illustrating the high level of responsibility agronomists have for providing advice on invertebrate pest management. Consequently, the workshops were redesigned to be more flexible and responsive to the composition of the participants and local issues. A total of 50% of workshops had either a field component or insect identification session. A very low level of interest in follow up field activities and support for local demonstrations meant that this component of the project plan did not eventuate.

Impact of the workshops on changes in attitude and practice

The project evaluation sought to identify what aspirations for change participants had, whether these have been realised, what impact the change has had, and how the workshops influenced these changes.

Efficacy of the workshop content and delivery

Take home messages articulated by participants at the end of the workshops showed that the key messages on IPM fundamentals had been effectively communicated and included:

- Importance of monitoring (number of times identified =62)
- Need to consider more strategic use of chemicals (53)
- Thresholds (51)
- Importance of correctly identifying pest and beneficials (51)
- Consider beneficials in decision making (37)
- IPM is worthwhile (22)
- Need to understand the lifecycle of pests (21)
- Need to consider a wider range of control/management options (21).

Planned change

Surveys of participants at the conclusion of each workshop found the majority could identify something that they felt they could, or would, change. Increased monitoring (more comprehensive and more often, improved technique) was the most frequently identified intended change.

Other proposed changes (identified by at least 20 participants) were:

- 1) To review insecticide use practices, particularly the prophylactic use of insecticides.
- 2) Increased attention to pest/beneficial identification; and
- 3) Use of thresholds.

These themes are consistent with the take home messages identified and the core 'teachings' of the workshops.

The workshops achieved significant impacts

A total of 95% of those surveyed indicated that they had or were applying something they had learnt at the workshop. Thresholds, monitoring and increased consideration of beneficials were the three areas that respondents were addressing in

their pest management.

Changes implemented by agronomists following participation in an IPM workshop are estimated to have impacted on an average of eight clients per participating agronomist. If this level of impact was extrapolated to the 287 agronomists who participated (adjusted for the 5% who said they did not make any change = 272 agronomists), then the workshops could have potentially had impact on the pest management practices of 2,176 grower clients.

A total of 70% of all respondents (n=26) said they would not have made any change if they had not attended the workshop; 100% of the grower participants said they would not have made any change without the workshop (n=5). Twenty two percent of respondents said without the workshop they would have taken longer to implement change or it would have been less likely to happen.

The survey data showed 70% of respondents were motivated to change by a heightened perception of risk (pest, insecticide resistance, insecticide overuse) as a result of attending the workshop, while 15% of respondents had changed practice in order to provide a better service to clients.

Half (50%) of workshop participants in the Northern grains region indicated that they were already assessing beneficial insects, and consequently the level of change following the workshops was lower than that in other regions. However, in the other regions very high levels of change were reported. Across the Southern region, an average of 89% of respondents said there had been some or significant change to include beneficials in their scouting and decision making considerations.

While 40% and 70% of Northern region respondents indicated that they were now more likely or far more likely to consider or use a soft option. In the Southern region (SA, VIC, southern NSW), where soft options are not generally used, 86-100% of workshop participants indicated they would now consider and/or use a more selective option.

Survey responses indicated little planning is currently done for pest management, and how reliant agronomists and growers have been on controlling pests reactively. The vast majority of respondents indicated that they had made some or significant change to incorporate planning into their invertebrate pest management (82% overall). A proportion of respondents (20% in QLD, 25% in VIC and 11% in SA) indicated that they had made no change and still made decisions when the pests were evident.

The conundrum of growers as decision makers and agronomists as advisers

While growers rely heavily on agronomists for advice on pest management (100% of growers in southern NSW, northern NSW and QLD are receiving advice from agronomists for some, or all, insect pest management decisions), this does not mean that changes will occur because the agronomists are more aware of the need to change.

Ultimately, the grower is the decision maker and determines the level of risk and expenditure with which they are comfortable. There may be a significant difference in the grower's perceptions of risk and that of the more informed and experienced agronomist. This disconnect contributes to several of the barriers to IPM identified by workshop participants.

Clearly, there is a genuine imperative to educate growers in at least the basic concepts of IPM and the risks associated with continued heavy reliance on insecticides. Low grower engagement in learning about IPM poses major challenges to educating the grower community.

Perhaps the way in which grower education about IPM is approached needs to change. At present, growers are treated the same as agronomists, assuming that they also need to be able to identify pests and scout crops. It may be that growers need to understand how to assess risk of crop loss versus chemical options, to plan how they intend to manage invertebrate pests on their property, and how to interpret the advice of the agronomist in the context of their plans.

Other research

This list of knowledge, information and support gaps was identified by participants in the workshops.

Research

Thresholds

- o Validated threshold data required.
- o Multi-species thresholds i.e. what to do when heliothis and mirids are together at the same time in mungbeans.

- o More thresholds, rules of thumb and local data.

Beneficials

- o Insecticide impact on beneficials for broadacre crops and pastures (at lower application rates which are often used in broadacre).
- o Biology and ecology of beneficials. What is the lag period before they can provide useful levels of control?
- o Monitoring guidelines.

Calibration of sampling tools

- o Like to see cross calibration of different scouting techniques i.e. sweep netting versus beat sheet.
- Specific gaps in knowledge on key pests
- o Aphid ecology - interaction between hosts and pests.
- o Knowledge of current resistance levels - locally and seasonally.
- o Lifecycle information - how they feed, when they turn up.
- o Effects of fungicides and herbicides on insects.
- o 'Soft' control options for Rutherglen bug in sunflower and sorghum.
- o Seed staining data for soybeans.

Development

Decision support tools

- o More decision support tools. Similar to the sorghum and chickpea models and the CottonLogic Predator: Prey ration to be developed for broadacre crops.
- o CotAssist as an example of a decision support tool for aphids. Can something similar be developed to predict mites and aphids in broadacre?
- o Economic justification to support adoption of IPM.
- o More or improved prediction systems for insect incursions.
- o Population dynamics tools to help predict when problems will occur.
- o Like cotton logic tool on predator or prey ratios.
- o High-tech monitoring solutions that do not involve humans (e.g. automated low level aerial surveillance) to remove the human time constraint, sampling variability, access to dense crop canopies, etc.

Insecticide registrations

- o A more collaborative approach to minor use permits and funding with affected partners (industry) to obtain registrations i.e. involvement of Meat and Livestock Australia (MLA).
- o Registrations for new insecticides in summer pulses (e.g. mungbeans or soybeans) where the commercial potential does not justify registration cost.

Extension/Tools/Support

- o Beneficial identification App.
- o An insect identification App with information on lifecycles and identification (e.g. convert the I-Spy manual to an App).
- o A comprehensive resource for identification of pests and beneficials including lifecycles.
- o Access to entomologists.
- o Email alerts.
- o Continue with Pestfacts and Beatsheet.
- o Pest forecasting and early warning.
- o Updates on research.