

Providing an IPM Advisory Service for Tasmania

Dr Paul Horne
IPM Technologies Pty Ltd

Project Number: VG06088

VG06088

This report is published by Horticulture Australia Ltd to pass on information concerning horticultural research and development undertaken for the vegetables industry.

The research contained in this report was funded by Horticulture Australia Ltd with the financial support of the vegetables industry.

All expressions of opinion are not to be regarded as expressing the opinion of Horticulture Australia Ltd or any authority of the Australian Government.

The Company and the Australian Government accept no responsibility for any of the opinions or the accuracy of the information contained in this report and readers should rely upon their own enquiries in making decisions concerning their own interests.

ISBN 0 7341 2426 0

Published and distributed by:
Horticulture Australia Ltd
Level 7
179 Elizabeth Street
Sydney NSW 2000
Telephone: (02) 8295 2300
Fax: (02) 8295 2399

© Copyright 2010



Know-how for Horticulture™

Final Report

HAL Project VG06088

**Project Title: Providing an IPM Advisory Service for
Tasmania**

Authors:

Paul Horne and Jessica Page

IPM Technologies Pty Ltd

HAL Project VG06088

Project Leader:

Dr Paul Horne

IPM Technologies Pty Ltd

PO Box 560, Hurstbridge, Victoria 3099

Ph: 03 97101554

Fax: 03 97101354

Email: ipmtechnologies@bigpond.com

Other personnel:

Jessica Page

IPM Technologies Pty Ltd

This report provides the results of a project that trained interested farmers and agronomists in Tasmania in the use of integrated pest management (IPM). It achieved this by a combination of training workshops followed by on-farm demonstrations. This approach allowed the development of understanding of the principles of IPM, the factors involved in an IPM strategy for any particular crop and then the adoption on farm. This participatory research was a key element in the project and was responsible for a significant adoption of IPM by vegetable growers and agronomy companies.

This project was funded by HAL in partnership with AUSVEG. It was funded by the vegetable industry levy. The Australian Government provides matching funding for all HAL's R&D activities.

June 2008

Any recommendations contained in this publication do not necessarily represent current HAL policy. No person should act on the basis of the contents of this publication, whether as to matters of fact or opinion or other content, without first obtaining specific, independent professional advice in respect of the matters set out in this publication.



Know-how for Horticulture™

Table of Contents

Media Summary	5
Technical Summary	7
Introduction	9
Materials and Methods.....	10
Workshops	11
Table 1: The blank matrix used to develop an IPM strategy for any crop	12
Table 2: Summary of activities with collaborators and locations	14
Results.....	16
Discussion.....	18
Table 3: Advantages and disadvantages of adopting IPM	18
Table 4: A Comparison of IPM and Chemical based supports (derived from Bajwa and Kogan 2003)	19
Conclusions	21
Next Steps	22
Communication/ Extension.....	22
Acknowledgements.....	23
References	23
Appendix 1: Integrated Pest Management (IPM)	26
Other Pest Control Strategies that can be confused with IPM.....	28
Organics and IPM.....	29
Appendix 2: Outline of Integrated Pest Management (IPM) Workshop Content	30
Appendix 3: Where to find information or products:.....	32

Media Summary

The aim of this project was to demonstrate Integrated Pest Management (IPM) in action in a range of commercial glasshouse and outdoor vegetable crops in Tasmania. In addition to educating the relatively small number of growers directly involved in the demonstrations, the aim was also to train agronomists to be able to deliver the same results to a much wider grower group.

The project commenced with a series of workshops to explain what was involved with IPM and to identify people who wanted to trial an IPM approach in commercial crops. Then the project showed interested farmers and agronomists how to make decisions in the field using IPM strategies.

A key difference between a pesticide-based approach and an IPM strategy is the greater reliance on biological control and cultural controls. Biological control agents are the insects and mites that eat pest insects and mites. Cultural controls are management methods that either favour the beneficial species or are unfavourable to the pests.

Growers involved in the project have implemented IPM on their farms. This includes both large and small vegetable farms and outdoor and hydroponic producers. Tasmanian agronomists, especially from Serve-Ag and Roberts are now advising farmers on how to use IPM. This is now the starting point of a sustainable use of IPM in Tasmania.

That is, the farmers are using IPM and the agronomists are supporting this approach. Specific examples are the farms of Houston's and Harvest Moon implementing IPM and requiring on-going IPM advice, but also includes many other smaller farms. Such advice is now being routinely provided by agronomists that formerly provided only pesticide-based advice. This includes the major agronomy companies of Serve-Ag and Roberts. IPM Technologies P/L is still available as a resource to these providers but the input required is minimal compared to that required at the start of the project.

Technical Summary

The aim of this project was to demonstrate commercial Integrated Pest Management (IPM) in a range of glasshouse and outdoor vegetable crops in Tasmania. In addition to educating the relatively small number of growers directly involved in the demonstrations, the aim was also to train agronomists to be able to deliver the same results to a much wider grower group.

The project commenced with a series of workshops to explain what was involved with IPM and to identify people who wanted to trial an IPM approach in commercial crops. These workshops were held in Devonport at the offices of DPIPW at Stony Rise and were held with the assistance of the vegetable Industry Development Officer (IDO) and Tasmanian Institute of Agricultural Research (TIAR.)

Participants in the workshop included farmers from northern Tasmania and near Hobart as well as representatives of the major agronomy service providers to vegetable industry in Tasmania, Serve-Ag, Roberts and Agronico. Also attending were field officers from the processing companies Simplot and McCain.

The next step was for the project to show interested farmers and agronomists how to make decisions in the field using IPM strategies.

A key difference between a pesticide-based approach and an IPM strategy is the greater reliance on biological control and cultural controls. Biological control agents are the insects and mites that eat pest insects and mites. Cultural controls

are management methods that either favour the beneficial species or are unfavourable to the pests.

Growers involved in the project have implemented IPM on their farms. This includes both large and small vegetable farms and outdoor and hydroponic producers. Tasmanian agronomists, especially from Serve-Ag and Roberts are now providing commercially acceptable advice to farmers on how to implement IPM, compared to previous pesticide-based advice.

Information on IPM was presented in a format that had been previously developed by Paul Horne and Jessica Page of IPM Technologies P/L. The outline of the course and some of the information presented is given in Appendices 1, 2 and 3 of this report.

Introduction

The aim of this project was to demonstrate IPM (definition of IPM in Appendix 1) in action in a range of glasshouse and outdoor vegetable crops in Tasmania. In addition to educating the relatively small number of growers involved in the demonstrations, the aim was also to train agronomists to be able to deliver the same results to a much wider grower group.

It was hoped that the final outcome of this project would be growers who want to use IPM and agronomists able to deliver the support necessary for them to achieve this result. These aims were met in the course of the project.

Interest in the use of IPM grew in Tasmania from 2005 as a result of earlier vegetable industry funded projects which allowed IPM Technologies Pty Ltd (Paul Horne and Jessica Page) to conduct field demonstrations of IPM in lettuce (aimed at lettuce aphid) and in brassica crops. Growers saw for themselves that there is another approach to pest control that works, other than total reliance on pesticides.

Tasmania is well serviced by agronomists, but prior to this project those agronomists were unable to deliver such IPM advice. The situation is made more difficult by the fact that some of the agronomic advisors also sell insecticides. Independent advice on pest management using an IPM approach was currently not available.

It is relatively easy to demonstrate to farmers how IPM can work and show the results when expert advice is available. However, it is unrealistic to expect all farmers to be entomologists nor pathologists with expertise in IPM. *Agnotes and Ute Guides are not sufficient to achieve adoption.* Growers know that plants need water and nutrition, and employ agronomists to provide site-specific advice about these issues. IPM is exactly the same. If growers know that they do not have to apply routine broad-spectrum insecticides then the advice to use such products is inadequate. What they need is advice given from within an IPM framework and specifically for their crops. In particular, farmers wanting to change to using IPM need to have direct access to IPM advice and advisors when required in the transition from a pesticide-based

approach. This has proven to be an effective means of encouraging growers to adopt IPM even in the absence of any particular crisis in pest management (Horne, Page and Nicholson 2008).

This project aimed to demonstrate in as many crops as possible that an IPM approach will give good results and equal to or better results than a regular insecticide spray programme.

The project was initially proposed to be conducted in conjunction with the Tasmanian Fruit and Vegetable Growers Association (TFGA), and the vegetable industry IDO at the time was based with the TFGA. However, the collaborating individuals within TFGA had left the organization by the time the project was approved. There was a delay until the individuals were replaced which meant delays in starting the project. Then those individuals also left the TFGA. The next interim manager of the TFGA decided that the project was not one that they should be directly involved with and so the project was then run solely by IPM Technologies Pty Ltd with collaborating farmers and agronomists, with some involvement from TIAR and entomologists from the Tasmanian Department of Primary Industries (DPI).

Materials and Methods

The project needed to give growers and agronomists advice in the vegetable crops for which they were interested in using an IPM approach. The advice needed to cover everything that is required to control pests in commercial crops, including how to monitor for pest and beneficial species, so all involved could see how decisions were reached. The project needed to first find interested people (farmers, agronomists and field officers) and inform them about what adoption of IPM would mean on their farms and crops, and then to take the information into vegetable crops of interested participants for validation and demonstration.

Workshops

The approach taken was to run an initial series of 3 workshops on IPM for any farmers, agronomists or processors that were interested. These were advertised by the Tasmanian vegetable IDO (Roger Orr) and run at the DPIPWE offices at Stony Rise (Devonport). These three workshops were important in letting industry know about the project and identifying collaborators for the next stage of the project (field demonstrations). Further workshops were held with interested groups as the project progressed. Workshops were limited to a maximum of 15 participants.

Details of the workshops and some of the information presented are provided in Appendices 1, 2 and 3. The format and content of these workshops has been developed over many years by Paul Horne and Jessica Page and are a proven method of raising awareness and interest in IPM. Essentially each workshop consisted of three parts. Part one was a talk and discussion outlining reasons for using IPM and the components of IPM (biological, cultural and chemical). Different groups chose to spend more time on some aspects than others. For example, agronomists often chose to spend more time finding out about the impact of different pesticides within an IPM strategy. Part two was devoted to insect identification, with an emphasis on beneficial species. Participants were shown different life stages of some of the most important beneficial species in vegetable crops in Tasmania. Part three was spent developing an IPM strategy for one or more crops of particular interest to participants in any given group. The way in which this was achieved was by completing a blank table as shown in Table 1.

Table 1: The blank matrix used to develop an IPM strategy for any crop.

IPM in (crop type)

Pest	Beneficial	Cultural	Chemical

The requirement to achieve this successfully depended totally on the ability of the IPM experts to have sufficient knowledge to be able to deal with any pest combination in any crop to the satisfaction of the participants, which included senior agronomists, field officers and very experienced farmers. This was crucial to the success of the project as the completion of a draft strategy for any crop was necessary before participants would be confident to trial such an approach.

Thus the aims of the workshops were to provide information about IPM and to identify interested participants in a field stage of the project. Following the three initial workshops, all subsequent activities were with farmers or agronomists who wanted to see how IPM was implemented and so farm visits were arranged at appropriate times. Additional workshops were run when there was interest from a particular group of either agronomists or farmers. Table 1 provides a summary of workshops and on-farm visits with collaborators in the project.

The demonstration of IPM techniques to agronomists required a slightly different approach than that used with farmers, where the same crop or paddock was visited several times. To provide the demonstrations to agronomists it was necessary to visit sites or situations that were of importance to them at the time of the visit and then demonstrate how an IPM

approach would deal with the situation. The agronomist could then see how the decision was made and would be able to see the outcomes of such advice in follow up visits. If the farmer was present then a joint decision could be made so that all agreed on the decision-making and similarly, all could see the outcomes of the decision.



Figures 1 and 2: Jessica Page and Paul Horne conducting an IPM workshop in Tasmania

Table 2: Summary of activities with collaborators and locations

Date	Place	Activity	Collaborators
Jan 08	Devonport	Workshop- 1	TIAR, Agronico, Simplot
Feb 08	Devonport	Workshop- 2	Serve-Ag, Agronico, Roberts
Mar 08	Devonport	Workshop- 3	Mc Cains
10 Apr 08	Devonport	Workshop-	Serve-Ag
11 Apr 08	Launceston	TFGA interview	TFGA
5 June 08	Hobart	Workshop 25 people	Sophie Wadley, Serve-Ag
19 June 08	Devonport	Soils field day – 3 workshops 100 growers/ agronomists	Peter Aird, Serve-Ag
14 Aug 08	Whitemore	Workshop	Seona Findlay, Independent agronomist
15 Oct 08	Devonport	Farm Visits	Peta Davies, Simon Nowell (Roberts), Eric Gribble, Rob Henderson
16 Oct 08	Launceston	Farm Visits	Peter Aird, Graeme Palmer, Stephen Welsh (Serve-Ag)
30 Oct 08	Devonport	Farm visits	Peter Aird, Graeme Palmer, Owen Thomas
31 Oct 08	Devonport	Workshop	Roberts
20 Nov 08	Hobart	Farm visit	Houston's Farm
18 Dec 08	Devonport	Farm visits	Peter Aird , Rob Henderson, Eric Gribble
18 Feb 09	Hobart	Farm visit	Lee Peterson (ARM) Houston's Farm
19 Feb 09	Devonport, Burnie	Farm visits	Peter Aird, Bruce (Serve-Ag)
1 Apr 09	Devonport	Farm visits	Peter Aird, Rebecca Clarkson (Serve-Ag)
2 Apr 09	Devonport	Farm visits	Harvest moon, Lauren Damen, Simplot, Eric Gribble, Rob Henderson, ABC radio
21 May 09	Hobart	Workshop-	Houston's Farm
22 May 09	Devonport	Farm visits	Harvest Moon, Serve-Ag, Simplot, Mc Cain, Rob Henderson, Eric Gribble
16 Jul 09	Hobart	Farm visits	Houston's Farm

17 Sep 09	Devonport	WFW field day Farm visits	TIAR, Serve-Ag, Elders, Simplot, McCain Harvest Moon
7 Oct 09	Devonport Hobart	Farm visits	Peta Davies (Roberts) Houston's Farm
12 Nov 09	Hobart	Farm visit	Houston's Farm
13 Jan 10	Hobart	Farm visits	Houston's Farm, Ben and Colin Houston
14 Jan 10	Devonport	Workshop	Addison's Farm Serve-Ag
3 Mar 10	Hobart	Farm visit	Houston's Farm Ben and Colin Houston
14 Apr 10	Hobart, Devonport	Farm visits	Houston's Farm, Addison's Farm Serve-Ag
25 Aug 2010	Devonport	Farm visits	Addison's Farm Serve-Ag, Harvest Moon

There was a total of approximately 200 participants in the workshops listed above (Table 2).

Results

The workshops provided increased awareness of what was involved in an IPM strategy for crops of interest to the participants. It allowed the people present to see what they would need to do and what to change if they adopted an IPM strategy on their farm.

The completed table (shown in Table 1) was a key outcome for each and every crop that workshop participants nominated. When this was completed to everyone's satisfaction then of course there was general consensus that such a strategy could work, and this took considerable (perceived) risk away from those interested. That is, farmers could see what they would need to look for and what not to spray, and agronomists and field officers could see that a different set of recommendations were possible to achieve an equal or better outcome. Then there was the opportunity to take the next step and have at least some of every group agree to trial an IPM approach for one or more crops that they grew.

In this project there was success from each workshop and there was always some interest in taking the draft strategy into a commercial crop. That is, there were always interested growers and agronomists at the conclusion of each workshop who wanted to begin implementing an IPM strategy. Through this project it was possible for both groups to see IPM being implemented and to see the benefits. The difficult part – doing something very different in terms of pest management – was made less risky by the presence of IPM advisors who could give timely, site-specific advice as required.

The next stage was also successful in that growers and agronomists who commenced trials to implement IPM as part of this project almost always expanded their use of IPM to the entire farm. This result was reported in Good Fruit and Vegetable magazine in two articles. The first described the experience of Henderson Hydroponics (near Devonport) with the adoption of IPM in their capsicum crops. The second article described the adoption of IPM by Houston's Farm (near Hobart), by Harvest Moon (northern Tasmania) and by the agronomy company Serve-Ag P/L. These articles describe what were typical of the results with a range of growers

and agronomists involved with this project. Some growers decided to implement IPM on their entire crop immediately and others took longer. In each case the project allowed them to implement IPM in their crops at a rate with which they were comfortable.



Figure 3: Kate Turner monitoring crops at Houston's Farm near Hobart

Discussion

This project has resulted in a major shift in the approach to pest management by a range of farmers, including some of the largest vegetable farms in Tasmania and agronomists and field officers. It has been trialed and then adopted by farmers and companies on a full commercial scale. The benefits of using IPM have been summarized (Horne, Page and Nicholson 2008) as in Table 3, and all of these benefits apply here. In one case (dealing with western flower thrips in hydroponic capsicum production) the benefit was in changing a loss to tomato spotted wilt virus of 70% in a pesticide-based strategy to around 2% using IPM.

Table 3: Advantages and disadvantages of adopting IPM

Advantages	Disadvantages
Reduced dependence on pesticides	More complex than control by pesticide alone and requires a shift in understanding
Increased safety to farm workers, spray operators and the community	Requires a greater understanding of the interactions between pests and beneficials
A slower development of resistance to pesticides	Requires a greater understanding of the effects of chemicals
Reduced contamination of food and the environment	Increased time and resources
Improved crop biodiversity	Level of damage to the crop may initially increase during transition to an IPM programme, in some horticultural crops

One of the perceived differences between IPM and chemical based strategies has been that IPM was not promoted by private industry but rather, by public bodies (Table 4). However, as a result of this project, IPM is now being promoted by private organizations (such as agronomy companies) as well as public bodies.

Table 4: A Comparison of IPM and Chemical based supports (derived from Bajwa and Kogan 2003)

Pesticides	IPM
Compact technology	Diffuse technology with multiple components
Easily incorporated into regular farming operations	At times difficult to reconcile with normal farming operations
Promoted by private sector	Promoted by public sector
Aggressive sales promotion supported by professionally developed advertising campaigns	Promoted by extension personnel usually trained as educators not as salespersons
Results of applications usually immediately apparent	Benefits often not apparent in the short term
Consequently: pesticide technology was rapidly adopted	Consequently: Adoption of IPM technology has been slow

The project started slowly, as outlined in the Introduction. However, as it turned out the outcome of these changes was almost certainly better in terms of the results achieved, as the success of this project hinged on (i) direct access of project participants to the IPM specialists rather than a single IDO style position based with the TFGA and (ii) the involvement of senior agronomists and other advisors in Tasmania that were able to provide IPM advice to a wide range of their existing clients. One important outcome of this project has been the adoption of an IPM approach by respected, senior agronomists in Tasmania, (especially within Serve-Ag and Roberts) as well as more junior agronomists. These agronomists have influenced the decisions of many vegetable growers (and others) in a way that far exceeds what would be possible by a single IDO-type individual.

The agronomists and field officers involved in this project now have the ability and confidence to offer IPM advice for growers that are interested. This will continue after the conclusion of

the project. In large part this is because of their increased awareness and understanding about the role of pesticides within an IPM strategy and how different products can affect populations of beneficial species. This now allows them to make better recommendations regarding pesticide use. Even when new products arrive on the market these agronomists are now asking for information about the impact of these products on beneficials.

Tasmanian agriculture is a little different to that on most mainland Australian farms simply because of the range of crops that a single farm may produce. It is not restricted to vegetables, and a single farm will often produce other horticultural crops (pyrethrum, poppies, potatoes, onions, grapes) and may produce broad-acre crops such as wheat, barley canola and also pasture. The agronomists that advise farmers in Tasmania also provide advice for these other crops and so this project has had influence beyond vegetable production.

In a recent paper (Horne, Page and Nicholson 2008) reasons for adoption or non-adoption of IPM by farmers was discussed as follows:

“One likely factor for the poor rates of adoption in some cases is that researchers have concentrated on a single pest and have not dealt with all pests in a crop (Sivapragasam 2001, Blommers 1994, Olsen et al 2003). Integrated mite management in apples (Albajes et al. 2003) is one example of this approach. Also, when the current pesticide based strategies work, then there is an absence of a crisis to demand an alternative approach. When pesticide-based strategies work and when information given to farmers is complex, and is given without contact with an IPM expert to help with implementation, then it is easier for a farmer to use an established, proven and simple pest control method that relies totally on pesticide application. For an IPM strategy to be effective it must deal with all pests in the crops (FAO 2000; Trumble 1998) and ideally would be as easy to implement as a pesticide – based strategy.”

This next step of moving from awareness to adoption is the one that has often been difficult for many researchers to achieve. However, the approach taken in this project was one that has been proven to work in many situations from horticulture to broad-acre farming and involves

farmer-participatory trials. It commences with a workshop to explain IPM and to produce a strategy that can be used as a guideline to implementation. This approach has been used successfully by Paul Horne and Jessica Page in a wide range of crops in Australia and New Zealand) (Horne, Page and Nicholson 2008, Horrocks, Davidson, Teulon and Horne (in press)). This project has demonstrated again how IPM can be adopted by farmers growing a range of different crops by providing IPM support, even in the absence of any particular crisis.

One point that is relevant to many other horticultural farms is the fact that the work at Henderson Hydroponics (see Good Fruit and Vegetable article) was to achieve control of western flower thrips that were vectoring tomato spotted wilt virus. This shows how adoption of true IPM using the approach demonstrated in this project can achieve control of this serious pest using existing knowledge.

To provide on-going IPM support, an important component of the project involved working with advisors who were interested in providing IPM advice. Therefore on each farm visit with an agronomist there was a training aspect that would provide confidence in an IPM approach and decision-making. Many of the activities in the final year involved visiting farmers with their agronomist/advisor and working on particular pest issues for that farm.

Conclusions

1. This project has been successful in providing IPM advice to the Tasmanian vegetable industry and has demonstrated how to achieve adoption of IPM in a range of vegetable crops, even where there is no particular crisis in pest management. The approach used provides a pilot of a method to achieve adoption of IPM in a wide range of crops.
2. The project has also demonstrated how to deal with western flower thrips in vegetable crops – a topic of interest to many and considered extremely difficult.
3. We suggest that this project could be a model for other IPM projects across Australia and not only in vegetable crops but in all areas of horticulture.

Next Steps

Horne *et al.* (2008) noted that: *“Once IPM has been adopted, there is still a requirement for constant collaboration between entomologists, farmers and agronomists to avoid IPM being seen as simply an alternative insecticide programme. Once IPM for invertebrate pests has been adopted, there is further opportunity to increase the scope to deal with a range of other pests in an holistic approach.”*

When it is required, IPM Technologies Pty Ltd will continue to provide technical support to agronomists and farmers who have now adopted an IPM approach. It is expected that those involved (eg. Houston’s Farm, Harvest Moon, hydroponic vegetable growers, agronomists from Serve-Ag and Roberts) will not require the same level of support as was needed in the earlier stages of the project, but will require occasional support. One example of this support is where new insecticides arrive on the market and there is a need to know what impact these products may have on the key beneficial species in different crops.

The range of crops grown by growers in Tasmania means that any future work should not be restricted to vegetables, but also take into account other crops in the rotation within any paddock and the impact of these other crops on overall pest management.

Communication/ Extension

This project was essentially all about communications and extension, and so each activity was designed to help increase adoption of IPM. However, the items listed below were particular examples of where information was provided to a wider audience.

- Good Fruit and Vegetables, August 2009: ***IPM Boosts Capsicums***. An article about IPM adoption at Henderson Hydroponics near Devonport.
- Good Fruit and Vegetables, January 2010: ***IPM Treats Tasmanian Crops***. Three case studies of IPM adoption in Tasmania.

- ABC Radio broadcast several items about the IPM activities of the project.
- Tas Country is a Tasmanian newspaper that wrote several articles about IPM and the project during the life of the project.
- Each farm visit and workshop was an extension activity that helped to promote and demonstrate IPM and how it could be applied.

Acknowledgements

Firstly, we particularly thank Lionel Hill (DPIPWE, Stony Rise) for the many times he has provided entomological advice and encouragement for this project. We would like to thank the following individuals for their support during this project: Peter Aird & Doug Green (Serve-Ag, Devonport), Stephen Welsh (Serve-Ag, Launceston), Peta Davies and Simon Nowell (Roberts, Devonport and Burnie), Rob Henderson & Eric Gribble, Ricky Munnings, Kate Smith, Mark Kable, Colin Houston, Ben Houston and Roger Orr (vegetable IDO, TIAR, for part of the time during this project).

References

- Albajes, R., Sarasua, M.J., Avilla, J., Arno, J. and Gabarra, R. (2003). Integrated Pest Management in the Mediterranean Region: the Case of Catalonia, Spain. pp. 341 – 355. in *Integrated Pest Management in the Global Arena*. 512pp. Maredia, K.M., Dakouo, D. and Mota-Sanchez, D. (eds). (CABI Publishing, UK)
- Bajwa, W.I. and Kogan, M. (2003). IPM adoption by the global community. pp 97 – 107. in *Integrated Pest Management in the Global Arena*. 512pp. Maredia, K.M., Dakouo, D. and Mota-Sanchez, D. (eds). (CABI Publishing, UK.)

Blommers, L.H.M. (1994). Integrated pest management in apple orchards. *Annual Review of Entomology* **39**, 213-41.

Food and Agriculture Organisation (2000). An evaluation of the impact of integrated pest management research at international agricultural research centres. A report from the Technical Advisory Committee's Standing Panel on Impact Assessment. TAC Secretariat, Food and Agriculture Organisation of the United Nations.

Horne, P.A., Page, J. and Nicholson, C. (2008). When will IPM strategies be adopted? An example of development and implementation of IPM strategies in cropping systems. *Australian Journal of Experimental Agriculture* **48**:1601 - 1607.

Horrocks, A., Davidson, M.M., Teulon, D.A.J. and Horne, P.A. (in press). Demonstrating an integrated pest management strategy in autumn-sown wheat to arable farmers. *New Zealand Plant Protection Conference, August 2010*.

Olsen, L., Zalom, F. and Adkisson, P. (2003). Integrated Pest Management in the USA. pp249 – 271 in *Integrated Pest Management in the Global Arena*. 512pp. Mareida, K.M., Dakouo, D. and Mota-Sanchez, D. (eds). (CABI Publishing, UK.)

Sivapragasam (2001). Brassica IPM adoption: progress and constraints in south-east Asia. Available online at <http://www.regional.org.au/au/esa/2001/03/0301siva.htm>

Trumble, J.T. (1998). IPM: Overcoming conflicts in adoption. *Integrated Pest Management Reviews* **3**, 195 – 207.



Figure 4: Mark Kable and Kevin Temple of Harvest Moon in an IPM grown crop of broccoli.

Appendix 1: Integrated Pest Management (IPM)

The term “IPM” is well known these days and the letters stand for **I**ntegrated **P**est **M**anagement.

The term has been widely used (and confused) and so there are very many interpretations of what IPM means. So what does IPM really mean?

IPM involves 3 control components and they must be INTEGRATED so that they are compatible (ie working together, not against each other).

The three components are

1. Biological control.
2. Cultural control and
3. Chemical control.

Biological Control means using other invertebrates (such as insects, mites and spiders) that eat species of pests. In some situations, such as Hydroponic vegetables and ornamentals, the use of commercially reared beneficial species is currently economically viable if used within an IPM strategy. In most outdoor vegetable crops biological control relies on the use of naturally occurring invertebrates.

IPM cannot exist if there is not a fundamental reliance on biological controls. Be wary of statements that IPM is just Integrated Pesticide Management.

Cultural Control means using management methods (such as tillage, rolling, irrigation, weed management, rotation, time of planting, sequence of planting) to

help to control pests. It can also include planting specific crops to attract beneficial species or encourage their presence.

Chemical Control means using particular selective pesticides to support the biological and cultural control of pests. This option is very much the third choice, not the first choice. This is a fundamental difference between an IPM approach and a conventional pesticide-based approach. The selection of pesticides will be based on reduced impact on beneficial species as well as efficacy on pests.

Regular Monitoring of crops for both pests and beneficials is necessary so that decisions on the effectiveness of biological, cultural and (previous) chemical controls can be made, as well as on any requirement for the use of pesticides.

The “I” part of IPM has often been forgotten. It is essential in any IPM programme in any crop that control measures are integrated so that they work together in a compatible way. It is also essential that biological control agents are integral in any IPM strategy.

The easiest way to differentiate IPM approaches from others that may appear to be IPM is to look for the role of beneficials and cultural controls, and also look for chemical options being supports, rather than “first choice” options.

Integrated pest management is a concept that was developed in the 1940’s to provide a method of dealing with pests that are not easily dealt with by a simple broad-spectrum pesticide application.

Dealing with all pests:

In practice, an IPM approach needs to deal with all pests, not just one or two. For example, in brassica crops we need to deal with Plutella, Cabbage White Butterfly, Aphids, Centre grub and grasshoppers.

That means that the control options (especially pesticides) need to be integrated to make sure that the control of aphids does not interfere with the control of *Plutella*. That is, an IPM approach needs to avoid broad-spectrum sprays for one pest (eg. Spraying synthetic pyrethroids, organophosphates, fipronil) in order to avoid the disruption of the control of other pests. So, avoid killing beneficial species that would otherwise have helped to control pests such as aphids with the sprays you are using for *Plutella*.

It is very possible to see IPM in action. It is currently occurring in hydroponic and outdoor vegetable production, but also in a range of broad-acre cropping.

Other Pest Control Strategies that can be confused with IPM

There are several other legitimate strategies for controlling pests that can be confused with legitimate IPM strategies. These include:

Spraying organic certified products.

The sprays may be certified organic but a regular spray based programme is not IPM. IPM requires more than an organic spray programme.

Spraying "IPM" products.

Some people believe that by simply using products (organic or conventional) that can possibly be incorporated into IPM strategies that they are implementing IPM. This is not so. The insecticides that may be used in an IPM strategy do not in themselves make an IPM strategy.

IPM = Integrated Pesticide Management

There are people that would have farmers believe that IPM means Integrated Pesticide Management. Obviously if the requirements for biological and cultural components of IPM are not met then this is a completely different version of IPM, and not one that could be accepted. (see next item)

Pest Monitoring

Monitoring for pests and using insecticides according to pest levels is a legitimate approach to pest control but is not IPM as it does not incorporate biological and/or cultural control options.

IRM strategies

Insecticide Resistance Management strategies are legitimate approaches to prolonging pesticide efficacy but are certainly not IPM strategies. These are methods to prolong the effectiveness of pesticides with or without IPM.

No insecticides used.

Although the aim of any IPM strategy is to minimise the use of insecticides, the simple stopping of use of insecticides (conventional or organic) does not mean that IPM is being practiced.

Organics and IPM

If you accept what we have said about IPM then you will see that the only difference between IPM grown Organic crops and conventional crops is the list of pesticides that can be used to support cultural and biological controls. In many cases the preferred list will be the same. That is, BT sprays, NPV virus, spinosad or oils are the sprays to be used to support the biological and cultural controls. Broad spectrum sprays such as Pyrethrum are not easily compatible with an IPM approach.

Prepared by Dr Paul Horne, Jessica Page and Peter Cole of IPM Technologies Pty Ltd, 2007.

Appendix 2: Outline of Integrated Pest Management (IPM) Workshop Content

Conducted by Dr Paul Horne and Jessica Page

IPM Technologies Pty Ltd

The Principles of Pest Management and IPM explained

Examples of pest control using different methods: Chemical and Biological

- Includes: examples of successful Integrated Pest Management

Components of IPM

- Includes: the role of Monitoring

Factors to be considered in an IPM Programme

- Includes:

Pest complex/Beneficial complex

Pesticide history/ Level of insecticide resistance

Pesticide effects on beneficial species/ Risk of Damage

Costs/ Sources of Beneficial Insects and Mites

Monitoring

- Includes:

Resources to support correct identification of pests and beneficials

Pest and beneficial identifications relevant to participants.

Effects of chemicals on pests and beneficials

Cultural control methods: Examples from different crops

Decision-making

Includes:

Assessing the Risk of damage – short-term

Cost of damage – short-term versus long-term

Design and Implementation of an IPM Programme

Includes:

Sources of biological control agents / Role of chemicals

- Range of pests (is it known?)/ Costs – short and long-term
- Residual toxicity of pesticides/Cultural control options
- How to monitor

Appendix 3: Where to find information or products:

IPM:

Integrated Pest Management for Crops and Pastures by Paul Horne and Jessica Page

CSIRO Publishing. Landlinks Press. 119pp. (2008). \$49.95 + GST

www.landlinks.com

Beneficial Insects and Mites:

The Good Bug Book (2002)

Australasian Biological Control Inc.

www.goodbugs.org.au

Other Web Sites

Be careful when getting information from overseas websites. They may use the same common name for a different species that we do not have in Australia. Make sure that they are talking about the same thing.

Other books

Many different industries have guides to insect pests. Some include beneficial species as well as pests and diseases. Ute Guides are available for broad-acre crops. There is actually a good deal of overlap between many different crops, including vegetables to broad-acre.

Hand lenses

Optical Suppliers or contact us.

Yellow Sticky Traps

Bugs for Bugs, Mundubbera, QLD

Ph: 0741654663

Pheromone Lures

Entosol Pty Ltd

Ph: 02-9758 4552

IPM Monitoring, Advice and Insect Identification:

IPM Technologies Pty Ltd

www.ipmtechnologies.com.au

Ph: 03 9710 1554