

**Overseas study trip to expand capabilities  
in biocontrol mass production, marketing  
and large-scale uptake.**

James Altmann  
Biological Services

Project Number: VG08010

## **VG08010**

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*Know-how for Horticulture™*



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### **Statement of Purpose of Report**

The focus of this study tour was to gather information on new biocontrol production and packaging technology, and to utilize this to help improve the range of commercially available biocontrol agents, and to deliver them to growers using methods that increase the effectiveness, and quality of the organism, and aid in the ease of distribution within the crop.

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## MEDIA SUMMARY

Over the past 5 years the Australian protected cropping industry has experienced unprecedented growth utilizing investment in high technology structures, with sophisticated environmental controls and hydroponic growing systems. There is a growing demand for integrated pest management (IPM) solutions within this industry, with biological control agents (BCA's) at the forefront of these programs.

The current production and packaging systems for BCA's in Australia have been developed on small scales compared to companies overseas which have had larger markets, and a longer time frame to develop their techniques. These companies particularly in Europe have a much wider range of BCA's as control options compared to the emerging industry in Australia.

Through this project I was able to meet with biocontrol producers in the UK, Belgium, Netherlands, Spain and Israel to discuss technology advances in mass production, packaging and distribution systems for BCA's. Practices used in the management of large scale biocontrol programs in greenhouse crops were sought also from principal IPM researchers with an emphasis on development of new biocontrol agents for use in Australia to broaden the range of control options for our vegetable industry. Samples of biocontrol packaging were procured to improve BCA delivery, and packaging machinery viewed to potentially streamline production when needed in the future. Systems for the upgrading of packaging and delivery systems of BCA's could be implemented in the future as the biocontrol industry expands. At present these systems are unaffordable for the volume of production within Australia.

Key beneficial organisms now targeted to add to the range of biocontrols produced in Australia will include *Eretmocerus warrae* for greenhouse whitefly, *Neoseiulus californicus* for Two Spotted mite, and a wider range of Aphid parasitoids starting with *Aphelinus abdominalis*. These organisms have now been collected from the field in Australia by Biological Services and insectary colonies have been initiated. Further research and trials are needed over next 1-3 years to develop rearing, packaging, delivery and end use programmes for growers.

Biology of *Eretmocerus warrae* will be further studied over next 2 years in a HAL project VG10062 to determine its effectiveness under various environmental conditions.

Key information on rearing techniques was also procured during this trip for the production of predatory bugs. This has been utilized by Manchil IPM Services for the HAL project VG08186 - Rearing *Orius armatus* for the vegetable industry. This information will also be shared with Biocontrol Solutions for their HAL project VG10020 Australian mirid bugs as biocontrol agents.

## INTRODUCTION

IPM programs for pest control in Australia in many horticultural crops has improved and increased over the last decade. There is a greater awareness of the benefits of beneficial organisms in the ecosystem, and an acknowledgement of the problems that regular broad spectrum pesticide useage can cause. Use of insectary produced biocontrols is growing, but is still a small industry compared to chemical control. Challenges faced by biocontrol producers include limited research into biocontrol, access to useful organisms, development of rearing techniques, development of processing/packing/transport and delivery systems, variable freight services delivering a perishable product, culturing year round for seasonal use, variations in climate and fragmented growing districts throughout Australia, new infrastructure and costs for each new organism, promotion/extension of new products to ensure rapid uptake and useage, lack of educated IPM field consultants to advise growers, seasonal pest pressure (too high or too low), labour intensive industry with a high cost for labour, and poor commodity prices for growers. The range of biocontrols available to Australian growers is expanding, but the lead time for each new organism is quite slow, often several years due to these and other constraints.

Current mass production and packaging systems for the biocontrol agents (BCAs) targeted in this project were developed when the protected cropping industry and thus the market for BCAs was much smaller. The present production and packaging methods for BCAs are labour intensive, inefficient, costly and lack mechanization, placing limitations on the ability of the biocontrol industry to meet the increasing demand. To enhance the development of the commercial biocontrol industry in Australia new, more efficient systems for the mass rearing, packaging, and distribution of selected BCAs through the large areas of new greenhouse production are urgently needed. In Australia, biocontrol companies are much smaller than their overseas counterparts and do not have the resources to fund R&D departments. In order to expand capabilities in mass production, marketing and large-scale uptake must seek external assistance.

The objectives of this study tour are to:

1. Meet with overseas biocontrol producers in the UK, Belgium, The Netherlands, Spain and Israel to discuss accessing technology advances in the mass production and packaging of, and distribution systems for BCAs with particular emphasis on predatory mites; and
2. Discuss practices in the management of large-scale biocontrol programs in greenhouse vegetable crops.

## EXPECTED OUTCOMES/RESULTS OF VISITS AND DISCUSSIONS

### **1. Intellectual Property for new technology advances in mass production of Biological Control Agents**

Non disclosure agreements were effected with all companies visited before any discussions were commenced. In some cases companies were in the middle of patenting the procedures for some of their more recently developed BCAs. The content of such procedures is jealously guarded. Whilst I was able to build upon our commercial and personal relationships with key owners and staff of the main companies, there is a closed door to full access of procedures, and no interest in collaboration with Australian companies. This is understandable as Australia is a long distance from Europe and is a small market in comparison. There is also strong competition between biocontrol companies in Europe and any advantage one company may have over another may have taken years and a lot of investment to develop.

Some interest was generated in overseas companies trading information for access to some of Australia's unique beneficial organisms. However this was very quickly dismissed when draft agreements went to the companies legal departments as not being of enough benefit to divulge any information.

**Outcome** - access to IP for whole systems not procurable.

Colleagues were helpful in identifying some key gaps in biological control organisms for Australian IPM systems. By divulging some of our own rearing methods to companies that were rearing the same or similar organisms to our business we were also able to gain helpful information to improve some of our rearing procedures.

**Outcomes** - need another organism to help *Encarsia Formosa* for Greenhouse Whitefly control. We have been able to access a local species *Eretmocerus warrae* which appears to have higher temperature tolerance, and will also fly during low light conditions.

- need more organisms to control a range of Aphid species. *Aphelinus abdominalis* is present in Australia and able to parasitise larger aphid species, than *Aphidius colemani* which is only aphid parasite commercially available at present. A colony of *A. abdominalis* has been commenced. Other *Aphidius* species are also known to occur in Australia and may be studied in the future.

- need high temperature tolerant Two Spotted mite predator similar to *Neoseiulus californicus*. We believe that recent collections from the field have uncovered this predator or very similar. Awaiting identification. A colony has been initiated.



- need more thrips predators to target Western Flower Thrips in particular. Some helpful information was accessed in regard to rearing *Orius* species for control of thrips in a range of vegetable crops. This information has been shared with Manchild IPM and Biocontrol Solutions for current and future research projects.

## 2. Packaging and Distribution systems for biological control agents

The larger companies had turnovers up to 500 times the size of our own business. One company had 20 full time staff devoted to R&D. Whilst most rearing procedures were off limits, we were able to access useful information on the automation of packaging and the design of distribution systems for a range of organisms. Of particular interest is the use of slow release sachets for predatory mite distribution in greenhouses. Unfortunately these machines are in the range of several hundred thousand dollars, and not yet economically viable for consideration, but will be useful in the future. However various methods for mechanical distribution of predators in crops utilizing small hand held fertilizer spreaders, to purpose built fan assisted blowers have been developed. These units are accessible, and relatively low cost. Containers that are utilized by overseas companies for freight forwarding BCAs to customers were also researched, and some can either be copied in Australia, or procured directly from companies utilizing them overseas. This is being investigated further with the hope that this may strengthen collaboration in the future.

**Outcomes** - high volume automated machinery available for packaging of some BCAs when market expands. At present cost is out of reach.

- Some inexpensive aids available for distribution within the crop.
- Containers currently being used for freighting to customers are being reviewed for improvements based on those used overseas.
- Ongoing contact with machinery companies with possibility of lower cost or second hand machinery to modify from the food packaging industry.

## **IMPLICATIONS FOR AUSTRALIAN HORTICULTURE**

This trip provided a valuable insight to the potential future of biocontrol and IPM for Australia. By travelling overseas we were able to meet with large, successful and long established biocontrol companies. These companies have established rearing, packaging, and delivery technologies that can potentially assist our industry to provide a greater range of BCAs, mass produced more efficiently, and provided in a range of packaging that will be of benefit to Australian vegetable producers especially those using protected cropping techniques.

Establishing these valuable contacts within the industry has been extremely important and already useful. The potential for future collaboration may develop over time with more regular contact and familiarity.

Within 1 year of this study trip our company in collaboration with researchers and other local biocontrol companies will have available for field trials/and potential commercialization 4 new BCAs for the Australian horticulture industry. Information gathered from these overseas visits has directly instigated or facilitated the rearing, packaging and distribution of these organisms.

## INFORMATION DISSEMINATION

Information obtained as a result of these visits are treated as 'commercial in confidence'. This relates particularly to methods of mass rearing. All companies required us to enter into non-disclosure agreements before any discussions were initiated. We now need to honour this understanding and cannot divulge the specifics of the information gathered.

Our company with the aid of other biocontrol producers, and IPM consultants will upgrade information available to growers on a continual basis, as new BCAs and IPM methods become available. This information is available via our website and by direct grower contact and grower trials. Biocontrol Solutions have recently highlighted 2 new BCAs with feature articles in the 'Practical Hydroponics & Greenhouses' magazine. In the next issue *Eretmocerus warrae* will be featured – an organism that is now on route to commercialization with significant help from this project, and the next funding round.

Any new BCAs are unveiled to growers at AHGA and HFF conferences in the trade display section. This is usually accompanied by a lecture or seminar on the specific characteristics of the new BCA.

## RECOMMENDATIONS

Biocontrol producers in Australia are trying hard to increase the range of commercially available BCAs, and improve the effectiveness of IPM programmes across a range of crops and environments. This is a great challenge and needs continued support from research and extension agencies and funding bodies such as HAL. We need to simulate what has been achieved in Europe especially in regard to reduced chemical useage and increased reliance on biocontrol agents as a first choice option for pest management in food crops.

In the EU countries such as Spain and Belgium have government subsidization of biocontrols for growers to encourage uptake of these methods and reduce chemical reliance. By 2014 the EU will have a mandatory IPM code in place which will state that where available biocontrol will be the growers first option, and chemical use will be the last choice and closely regulated. I can hypothesise that growers from other countries will have to comply with similar practices if they wish to export produce to the EU after 2014. To further push the chemical reduction issue many supermarkets have lowered their own pesticide MRL (Maximum residue limit) in produce to 25% of the legal rate, and in some cases have instigated a zero MRL for particular chemicals.

I would like to recommend that our federal government look very closely at these policies, and get serious about regular testing of produce at the very least. The sooner we implement these types of practices the easier it will be to comply. At present it is widely known that chemicals are being used 'off label', at higher rates than are registered, on crops that they are not registered for, and withholding periods are not being adhered to.

Continued support of the biocontrol industry to increase its range of control options is one way we can help alleviate some of these desperate measures that growers resort to. Increased useage of biocontrols will give us the critical volume of production and sales to implement packaging and distribution systems that we studied in this project.

## **ACKNOWLEDGEMENTS**

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HAL for funding the project, and Brad Wells, Melanie Davies and Sarah Day for advice on how to conduct this project and patience with the report.

I would especially like to thank Stephen Goodwin and Marilyn Steiner (Biocontrol Solutions) for using their extensive contacts within the world biological control industry and setting up most of the meetings, and Stephen for helping keep discussions focused on the aims of this project. Their encouragement has been much appreciated and should lead to several new BCAs available to industry in the near future.

## ITINERARY / CONTACT LIST

- 1 IOBC Integrated Control in Protected Crops, Mediterranean Climate  
– Chania, Greece 6/9/09 – 11/9/09.

2 UK Insectary meetings:

Syngenta - Richard Greatrex [www.syngentabioline.com](http://www.syngentabioline.com)

BCP - Phil Walker [www.defenders.co.uk](http://www.defenders.co.uk)

Wye Bugs - Mike Copeland [www.wyebugs.co.uk](http://www.wyebugs.co.uk)

UK Research visits:

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Jude Bennison - IPM specialist [jude.bennison@adas.co.uk](mailto:jude.bennison@adas.co.uk)

3 Europe Insectary meetings:

Koppert - Karel Bolkmans; Holland [www.koppert.com](http://www.koppert.com)

Biobest - Marc Mertens; Belgium [www.biobest.be](http://www.biobest.be)

Agrobio - Enric Vila; Spain [www.agrobio.es](http://www.agrobio.es)

Biobee - Shimon Steinberg; Israel [www.bio-bee.com](http://www.bio-bee.com)

Europe Research visits:

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MEETING OF THE  
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“INTEGRATED CONTROL IN PROTECTED CROPS,  
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