SEARCH CRITERIA

Model	Model C: Technological Development Model
Industry	Horticulture, vegetable
Focus/Level	Industry
Purpose	Testing available knowledge, creating new knowledge
Outcomes	Development of a management practice, development of a decision support system
Special Interest Groups	Ethnic
Design and Implementation	Designed and managed by researchers/experts, designed and managed by community/farmers

1. PROJECT TITLE:
Western Flower Thrips Management Strategy – pilot project

2. FUNDERS:
Horticulture Australia

3. PROVIDERS:
South Australian Research and Development Institute

4. KEY CONTACTS:
Tony Burfield, South Australian Research and Development Institute, Burfield.Tony@saugov.au

5. INDUSTRY/ISSUE/GEOGRAPHY:
South Australia
Vegetable Industry
Pests & diseases: Western Flower Thrips & Tomato Spotted Wilt Virus

6. PROJECT CONTEXT:
Western Flower Thrips (WFT) seriously affects commercial production by many of the nations vegetable growers. In Virginia, as in many other areas, WFT has been responsible for causing damage worth millions of dollars to vegetable crops each year since it arrived in the mid 1990's.

WFT spreads Tomato Spotted Wilt Virus (TSWV) to many crops including tomato, capsicum, lettuce and potato and also causes feeding damage to many other vegetables if left unchecked. It can be very difficult to control with pesticides and can remain a problem throughout winter in greenhouses.

There is a strong Vietnamese community (50-60% of growers) working in the industry in the region.

7. PROJECT NICHE (SPECIFIC OBJECTIVES):
The extension program aimed to promote awareness, understanding and adoption of specific pest management technologies that yield better results by taking more account of the total farming system.

This pilot project set out to achieve two main objectives for the vegetable industry:

1. Transfer technology for managing Western Flower Thrips (WFT) and Tomato Spotted Wilt Virus (TSWV) to vegetable growers using the training manual developed by IHD Victoria and technical support from SARDI entomology
2. Develop and test extension strategies for technology transfer

The project was active in four main ways to pursue these goals:

- Adapting the recommended WFT Management technology and confirming its effectiveness for local cropping conditions
- Providing public information on WFT control and building local recognition of the program
- Keeping industry network members informed and building further partnerships and strategies to support the project
- Providing effective technology transfer to growers through a program of recruitment and extension activities (group and 1:1)

8. PHILOSOPHY/APPROACH:
This is an example of a *technological development model.*

These outcomes were developed through the *co-operative effort* of all concerned players rather than being 'pumped in' by experts alone. Growers worked together with scientists, resellers, technical consultants, extension workers and other regional stakeholders to carefully shape existing technical resources into an effective local industry based program.

Adoption of IPM was viewed as requiring a major change in philosophy, knowledge and skills. It was felt that these changes needed to be supported by all players associated with industry practices so all players need to participate in the learning process !

This involvement was achieved by leading the extension team, and to some extent the growers and other stakeholders, through an informal "Action Learning" process. Everybody was learning a lot, not just the growers, which provided a flexible way for the project's strategy to improve and adapt as it progressed. This was seen as ideal because extension cannot be too fixed in its content or methods or it won't be flexible and sensitive enough to fit the specific learning situation. It needs to find its way through a continuous two way communication and learning process. This avoids mismatch occurring between the intended, or ideal learning and what is actually possible and required.

Action learning used in the context of this project was described as simply turning needs or issues into action that is:

- inclusive and supportive toward all relevant stakeholders
- jointly owned, designed and evaluated by both facilitators and learners
- based on a continuous exchange of information to develop understanding of the problem, relevant knowledge and results
- focused on practical applications so that learning outcomes can be confirmed and further needs and opportunities made apparent.
- open ended and continuous which means that it can expand and develop in content, participation and direction as needed

This approach was seen to allow people to engage in the learning process in whatever way is appropriate to their needs and interests and this is what has happened !

Grower confidence in new technology, and in their ability to implement it, was seen as the main requirement for adoption of new pest management practices. Information alone was not considered effective. The relevance and effectiveness of recommended practices was therefore communicated at every opportunity using hands on experience and other local examples.

As far as possible individual growers participating in the program received post training follow-up "On Farm". This was particularly powerful in generating and strengthening grower confidence and participation. The Vietnamese growers responded by forming continuous learning and adoption group for regular meetings.

The project team also publicly promoted pest management activities and outcomes using local information on pest management issues, activities and successes to the industry and other regional, technical and funding stakeholders.

9. RESOURCES, MANAGEMENT AND STAFFING STRUCTURES:
The pilot project ran from July 2000 to June 2002.

Funding was provided by Horticulture Australia at $90000 for the first year and $60000 for the second. [A new project emerged out of the project from June 2002 based on multiple pests and biological as well as chemical control]

A core team of three worked on this project: A full time IPM extension facilitator provided by SARDI; contracted horticultural consultant; and a person who was also able to assist with translation and liaison for the strong Vietnamese community.

A Grower Committee was established to get the project started [one interesting aspect was that the members on the committee generally did not participate in training – but saw the need for the wider grower group].

- Strong and developing technical input from a range of sources (SARDI, local horticultural consultants, NSW Agriculture IPM research projects, Biological Services and other commercial companies)
- Collaboration with Virginia Greenhouse Modernisation Project's biological pest control trials and wider extension program

10. PROCESS/METHODS USED:
Ongoing project development included the following:

1. The WFT management technology was adapted and tested under local conditions to generate local content and relevance with which to build grower interest and comprehension.
2. Methods of recruitment and ongoing grower liaison and support were developed to draw a conservative industry toward sustainable change.
3. The extension activities were piloted and refined to ensure that they were an effective way to communicate this technology to growers and assess adoption outcomes.

The specific strategy was described as incorporating:

- Access to technical expertise from SARDI, especially the entomology unit
- Availability of a pre-published training package from Horticulture Australia
- Translation of the training package into Vietnamese
- Research and technical information available through a national network of WFT researchers
- Information gathering and output activities to generate local pest information and create a public profile for the program
- Development of a local extension team to support the delivery of technical material, .Vietnamese translation and liaison and program planning and review
- A series of pilot training programs for 1. lettuce growers, 2. greenhouse growers and 3. Vietnamese greenhouse growers
- Other non-classroom extension activities to complement training
- A wide range of partnerships with industry and regional stakeholders
- Taking a flexible grower centred “Action Learning” approach

11. IMPACTS TO DATE (AND EVALUATION APPROACHES USED):

The evaluation undertaken has mainly been based on project teams experiences and records. A comprehensive team evaluation is currently (September 2002) being completed.

Technology adoption:

The greatest participation and gains involved Vietnamese growers (over 30) with 'low-tech' greenhouses and shadehouses (protected cropping). Nearly all of them effectively implemented core WFT management practices and significantly improved WFT and TSWV control with damage levels generally below %5.

Protected cropping operators in the program had little difficulty in understanding and implementing key management practices to improve thrips and virus management as a first step towards IPM.

The most important changes achieved by growers that enabled good WFT control on a 'low-tech' protected cropping farm were:

- Understanding the role of thrips in causing crop damage and the effect of seasonal cycles on pest activity and management
- Thorough weed clearance
- Establishing an effective, even if basic, pest and virus monitoring practice
- Prompt and effective clearance of old crops and TSWV infected plants
- Understanding how to minimise human transfer of thrips (and virus) from affected crop sites, usually entry and ventilation areas in greenhouses and shadehouses
- Improved spray coverage (worn spray jets are a very common fault)
- Understanding of chemical resistance management principles
- Better differentiation of different chemical groups and their properties as a basis to selection and rotation (as against brand names only)
- Improved pest exclusion through better greenhouse and shadehouse screening along with safer ventilation and entry practices

The lower number of English speaking growers (over 20) who participated have gained similar benefits to the Vietnamese growers, but were mostly field lettuce growers whereas the Vietnamese were all protected cropping growers.

Field lettuce growers believed that they reduced their TSWV damage levels by focusing on the following practices:

- sticky trap monitoring prior to planting as an aid to planning the placement and timing of crops based on neighbouring host plant risk assessment
- maintaining sticky trap monitoring during the crop cycle with plant inspections to ensure effectiveness of the spray program
- improved boundary and inner crop weed clearance
- improved spray coverage through various delivery adjustments

Greenhouse and shadehouse outcomes from the extension program were more significant than field crop outcomes. Protected cropping is a more complex and intensively controlled system with more opportunities for making strategic changes. Weed clearance provides a greater benefit in well managed poly/shadehouses than field crops because of greater restriction on thrips movement by the protective covering (on the other hand a poorly managed greenhouse can become a thrips haven from which other crops can be infested).

The project was viewed as having generated a wide range of 'flow-on' benefits including:

- Vietnamese growers are so satisfied with the results that they are keen to move on to multiple pest planning, and develop their total crop management expertise through establishing Farm Improvement Groups, beginning with IPM and other production management issues.
- Leading greenhouse growers are preparing to host biological pest control trials in their crops.
- A regional vegetation (weed control) strategy is taking shape through a working group of Landcare, Local Government, SARDI and an independent revegetation consultant.
- SARDI partnerships with the regions industry are now growing beyond the initial base established through this project and the Greenhouse Modernisation Project.

12. EFFECTIVENESS:

50 greenhouse and field growers at Virginia have been assisted to implement the recommended pest management practices for controlling WFT and TSWV. These growers are now regularly achieving greatly improved control of WFT in greenhouse crops and significant improvement in some field crops. **Virus damage this season was typically well below 5%.** These results for Virginia growers are a great step forward for the industry and commend national transfer of this technology.

These results have encouraged some growers to plan for trial implementation of biological control strategies. With or without biological control, they are now in a very good position to be supported in developing multiple pest control programs that will make a major contribution to sustainable Pest Management with reduced chemical inputs.

Apart from the adoption of WFT Management practices this developmental approach to extension enabled the project to support a wider range of outcomes:

- Progress toward IPM adoption by growers in relation to all crop pests and diseases
- Regional involvement in building IPM awareness through various partnership activities (i.e. a regional WFT monitoring grid, main street information displays, and a regional pest and vegetation working group, potential for a regional IPM signage initiative)

- Strong and developing technical input from a range of sources (SARDI, local horticultural consultants, NSW Agriculture IPM research projects, Biological Services and other commercial companies)
- Collaboration with Virginia Greenhouse Modernisation Project's biological pest control trials and wider extension program
- Strong expansion of grower involvement in integrated farm management through training in total crop management and business development programs at the Virginia Horticulture Centre

13. PROJECT DOCUMENTATION AVAILABLE:
Media Summary and Technical Summary available from Tony Burfield: Burfield.Tony@saugov.sa.gov.au

14. ISSUES:
Funding was sort beyond June 2002 to further develop the project to multiple pests and biological as well as pesticide controls.

Based on experience gained in this pilot. it was recommended that the existing extension team be resourced through a full time IPM extension position and operating funds over 3 years to co-ordinate the following activities:

1.Adoption of comprehensive IPM strategies

- Continue development of IPM adoption on the NAP by focusing on trialing and extension of multiple pest management systems and biological control in local crops. .Develop this strategy from farm based trials and demonstrations using grower graduates form the WFT program.
- Support this technology by developing a grower friendly information reference system that links crops to pests and available biological and chemical control options.

2. Attracting the lower participation grower groups
Inform the lower participating (English speaking) grower groups about program features for greenhouse and field crops that are likely to raise their interest, ie:

- *previous success with WFT*
- *forthcoming work with multiple pest and biological control systems in a range of crops*
- *continued promotion of improved spray programs and their benefits in all crops*
- *active connection with pest and crop management demonstration and extension at the Virginia GMP (English speaking growers seem to relate more strongly to an installation like this than to a group process)*
- *regional vegetation management studies and trial sites to control host weeds on farm boundaries and on farm properties*
- *continuing technical input from national and international sources of IPM technology*

3. Local partnerships
Strengthen existing local partnerships into a regional IPM program around strategic possibilities like the regional vegetation management strategy and development of a shared regional vision for a sustainable industry. IPM promotion and signage could be supported by the VHC, Virginia GMP, Playford council, SARDI and others as part of the leading edge of this vision.

4. IPM farm management tools
Develop comprehensive IPM farm resources in co-operation with the GMP greenhouse manual development, eg:

- *record keeping and decision making guides to support monitored spray programs for multiple pest and biological control programs*
- *a crop cycle pest management planning and action guide*
- *technical updates re multiple pest control and biological control*

5. IPM promotion and communication strategies. Future emphasis on communications is required to develop a user friendly and current web of information that would:

- Generate and maintain farm topic focused communication pathways for IPM researchers, extension officers and other providers of industry technology
- Has a window for growers that matches these topical areas.

This could begin by specifically evaluating the outcomes of the WFT project to develop a more focused and outward communication strategy that would:

- *Gather individual farm and wider industry information to demonstrate flow-on from intensively supported initial groups*
- *Address lack of extension outreach beyond NAP/SA by …*
- *Building national network & integration with concurrent H.A. IPM programs by…*
- *Engage International interest and partnerships in IPM by….*

This would connect the proposed new IPM project, emerging grower groups, Virginia GMP, regional NAP partners, SARDI, other national research sites and projects (esp. NSW), national industry interest groups, relevant international sources of expertise.

Possible outcomes could include a national IPM web page and a regional signage campaign for IPM.

6. Administration resources
Refine data collection tools and processes to support IPM extension program management, including regional strategic planning, partnership building, extension delivery, assessment, evaluation and program administration.

The minimum recommendation is to fund the preparation of a WFT/IPM information and management package that combines this project with the Victorian WFT manual and provides the following:

- WFT management technology summary in relation to documented farm assessments and experiences
- A package of extension resources and a strategic summary for regional industry adoption that reflects the action learning program experience with WFT Management
- Extension co-ordination resources to support project administration and networking functions

These resources may provide the basis for maintaining the existing grower group in self-help mode if they can obtain some co-ordination funding. They may similarly be transferable to other growing regions that are able to generate a strong IPM extension team to use them as a resource.

15. COMMENTS/CONCLUSIONS:
Project team reflections:

The road to successful adoption of the technology was viewed by the project team as the development of an effective extension strategy for IPM transfer to vegetable growers.

Benefits of the technology

- Farm assessments confirmed that extension of core IPM technology for WFT and TSWV can be very effective in 'low-tech' intensive protected cropping
- Strong and sustained grower interest shows that basic IPM can build a foundation of skills and confidence for growers to progress to multiple pest management strategies and biological control
- The formation and progress of a 'Continuous Improvement' greenhouse grower group shows that IPM extension can be used to lay a foundation for broader development of systems management in horticulture

Facilitating sustained learning and change:

- Farm visits, before, during and after training are central to successful learning by the extension team and growers because they enable the following things:
- Confirming the technical details of implementation
- Integrating new learning with the farm context by clarifying the factors and variables that affect implementation in the actual workplace.
- Enriching the ongoing extension program content and insight from the farm focus
- Obtaining valid and comprehensive evaluation and assessment data

Farm visits together with other grower meetings to review progress, discuss issues and plan to meet industry needs, will build strong relationships for sustainable change through:

- Further development of mutual communication channels that increase trust, credibility, information and understanding
- Identifying and discussing new issues ideas relevant to the industry support network, which becomes a culture of 'staying in touch with developments'
- Building self managing continuous improvement grower groups

Utilising extension partnerships and resources:
The following strategies have proved to be achievable and important for successful extension:

- Development of locally relevant pest management data and resources to complement the technology greatly improved extension delivery and outcome levels
- Building industry wide communication lines where the local network becomes a point of information transfer, input to the program and grower recruitment gave the program much more momentum and capacity.
- Involving industry and community stakeholders across a very broad range made a major contribution to extension success through partnerships for change that underpin IPM adoption by growers
- Wider communication and collaboration links from outside of the region, helped significantly to maximise local extension. This includes state, national and international sources. Communication technology like video conferencing could be used in future to great advantage with growers and industry.

Once the project was established it opened the lines for a wealth of technical input, regional partnerships and support for other related industry initiatives. These 'hidden' resources simply needed an active coordinated focus to identify and bring them together.

Apart from adequate program funding our success depended on a minimum set of conditions to get the Action Learning program moving:

- a technology starter package to match the technical needs
- a starting point for understanding local industry make-up, practices, networks and issues
- establishment of a core extension team to facilitate program development and activities from this foundation.

16. REVIEW METHODS:

This review was based on interviews with the project team following analysis of a comprehensive media statement and technical summary that they had prepared.
The project team had used reflection processes to review the pilot project and come to its conclusions about what worked and why.