

# Improvement of integrated pest management of brassica vegetable crops in China and Australia (CS2/1998/089)

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<b>Collaborating organisations</b>	Queensland Department of Primary Industries (QDPI), Australia; University of Queensland (UQ), Australia; Zhejiang Department of Agriculture, China; Shanghai Academy of Agricultural Science (SAAS), China; Zhejiang University (ZU), China; Zhejiang Academy of Agricultural Science (ZAAS), China
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<b>Related projects</b>	CS2/1992/013
<b>Principal researchers</b>	Bronwyn Holding (QDPI), Prof. Liu Shu-Sheng (ZU), Jian-xin Wang, Zhejiang Department of Agriculture; Mr Dong-Sheng Wang (SAAS), Guo Shi-jian (ZAAS)
<b>Duration of project</b>	1 July 1999 to 30 June 2002; project extension 1 July 2002 to 30 June 2003
<b>Total ACIAR funding</b>	\$830,366

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### Project objectives

The overarching objective of the project was to develop and implement sustainable management strategies for insect pests in brassica vegetable crops that significantly reduce pesticide hazards and are acceptable to growers in the Changjiang River Valley, China, and Queensland, Australia. To achieve this objective, several subobjectives were addressed through research directly linked to practical implementation:

- Complete investigations of the major quantitative factors affecting numerical changes in pest abundance in brassica crops in the field, and particularly the role that beneficials (parasitoids, predators and pathogens) play in suppressing pest populations.
- Determine the impact of major pests on yield and quality loss in major brassica crops and varieties under field conditions.
- Investigate on-farm strategies for improvement of insecticide application, particularly those options that promote the use of ‘soft’ insecticides and reduce the total input of insecticides.
- Assess the performance under farmer–field conditions of different pest management strategies, particularly those which enhance natural control agents.
- Establish resistance levels to major insecticides used in the brassica production system.
- Improve the methodologies previously developed for promoting implementation of integrated pest management (IPM) in brassica vegetable production, and apply these as widely as possible in the target areas.

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### Location of project activities

China and Australia

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## Overview

An integrated pest management (IPM) program was developed and implemented, resulting in reduced pesticide use, higher profits for farmers and safer vegetables in the project areas. The project provided increased infrastructure for agricultural extension and added to existing capacity in entomological research.

## Project achievements

A comprehensive IPM package for vegetable pests was developed for local conditions. This package was underpinned by extensive research and trials, and was widely disseminated for use by local extension workers and farmers during the project. At the end of the project 68% of farmers in the project areas took a positive attitude towards IPM, compared with 48% in the non-project areas. Also, 36% of farmers in the project areas took the approach of 'precaution first, less pesticides, more non-chemical methods', compared with 22% of farmers taking this approach in the non-project areas. In the project areas 38% of farmers were found to have more frequent contacts with, and advice from, local extension services, compared with 16% in the non-project areas. Since the completion of the project, nearly all commercial growers, through ongoing extension work, have become aware of the need to use IPM, resulting in virtually no pesticide residue violations in the project areas.



Professor Liu Shu-Sheng demonstrates the IPM package information to farmers in the project area.

There were significant reductions in pesticide use. As a consequence, farmers saved money and there were fewer residue violations of pesticides on brassica vegetables. Over the life of the project there was a significant increase in the capacity, both in terms of personnel and infrastructure, of the collaborating institutions to undertake research in pest management. The project generated considerable scientific outputs in terms of published papers and conference presentations. A follow-up project has also produced a user-friendly product—an interactive CD for brassica pest management in Chinese that will continue to benefit local extension workers and farmers in both the project areas and further afield. As a result of the research skills developed and the findings from this project, follow-up projects have been developed in the Democratic People's Republic of Korea (DPRK) and the South Pacific that seek to further extend this approach to brassica pest management to other countries and communities.

### The difference the project has made

Growers using the approach developed in the project use, on average, one to three fewer insecticide sprays, achieving comparable or higher yields than 'conventional' farmer practice. On average, growers save about RMB30 per crop. Farmers now generally apply insecticides that are targeted at specific pests, resulting in fewer pesticide residue violations. In the project areas there have been no pesticide residue violations in recent years, compared with an average of about 5% of produce registering violations in non-project areas. The resulting safer vegetable production, at a reduced cost, has ensured that deaths of consumers and growers due to pesticide toxicity have virtually ceased. There have been no poisonings or deaths reported from pesticides on vegetables since 2003.

Perhaps one of the biggest differences the project has made is that research and extension services are now much better networked in Zhejiang province.

### Project impacts

The project led directly to the development and production of an interactive CD that captured the approach developed for pest management of brassica pests. This CD will provide long-term benefit to extension workers as it enables them to access and readily present the information generated by the project. The CD has been used in training workshops for growers—in 2006 alone it was used in 200–300 workshops in Zhejiang province, each reaching 40–50 growers. This is over and above the success of workshops and field days in extending the IPM package to farmers during the life of the project itself. The enhanced research capacities of the project group and leader have been recognised nationally and internationally through scholarly publications and invitations to present project findings at major scientific meetings and to tackle new pest problems as they arise, for example the recent *Bemisia* whitefly invasion, now a major pest in China. The project developed a strong network, and a working relationship between researchers at Zhejiang University and the Zhejiang Department of Agriculture, that have meant more effective response to pest problems.