

# Making melons more marketable

## New technologies are boosting western China's melon industry

The harsh desert environment of western China, where it may rain only once every few years, is the setting for an ACIAR project to help develop the melon industry. With water in short supply, farmers use melted snow to grow melons and other crops. Diseases are a continuing problem, as is the distance to some of the markets in eastern China where the melons are sold.

A project funded by ACIAR is looking at ways to boost post-harvest disease control and improve market quality of melons in western China and the Australian Riverina.

The project, led by Dr Robyn McConchie of the University of Sydney, is building on findings from an earlier ACIAR project which highlighted the need for development of the melon industry in western China. This revealed the scope for disease control and supply-chain technologies to improve melon quality.

So far a number of pre-harvest treatments to control disease and maintain quality have been investigated. In Australia, the researchers are conducting trials in Mildura and Griffith.

Trials with products, known as resistance elicitors, which boost the plant's natural defence mechanisms, have reduced the incidence and severity of the field diseases bacterial spot and powdery mildew infections. The incidences of post-harvest fruit rots caused by *Fusarium*, *Alternaria* and *Rhizopus* have been significantly reduced by using a pre-harvest application of resistance elicitors. The researchers have also applied fungicides to the fruit as sole treatments or in conjunction with the application of pre-harvest resistance elicitors. Combining fungicide dips with fruit heat treatment generally increased the suppression of disease development.

Dr Stephen Morris, from the Sydney Postharvest Laboratory, said the team was making good progress in this area and the project was now focused on a main strategy involving pre-harvest resistance elicitors and post-harvest fungicide treatment. A pilot study demonstrating improved post-harvest technology is planned for later this year, following on from extension workshops held in China in 2004 to introduce farmers to supply-chain management concepts and seek their perceptions about future needs. Researchers are also looking at ways to improve farmers' market power by introducing storage facilities. To this end, a new coolroom/packing system being supplied by Rotary Australia will give them some control.

The project was fortunate in 2004

to have the assistance of an Australian Youth Ambassador, Ms Kim-Yen Phan-Thien, as a volunteer research assistant. Kim took part in the extension workshops. "Considering the Chinese culture, which promotes a respectfully subservient attitude to authority, it was heartening to see how comfortable and uninhibited the farmers became in the small group discussions, despite the presence of 'authorities' such as researchers and government extension officers," she says.

Some of the major issues that emerged from the workshops were temperature management and improved supply-chain relationships.

Kim spent the summer in Xinjiang, where she helped to plan, design, implement and assess the field trial in a government-owned agricultural area where many farmers grow melons as a cash crop, typically intercropped with cotton or sunflower. They tested the effects of pre-harvest sprays of resistance elicitors and fungicides on disease, yield, quality and post-harvest disease development. Sampling leaves for one of the tests involved a weekly three-hour trip by public bus to the trial site in sometimes extremely uncomfortable heat, carrying slabs of ice in a styrofoam esky, much to the curiosity of other passengers.

"The laboratory at XAU (Xinjiang Agricultural University) is the most under-resourced that I have worked in, with a supply of running tapwater only half the day, limited supply of glassware that must be shared by a large number of postgraduate students and equipment that is often malfunctioning or in disrepair," Kim says.

But, she adds, she learned to accept such setbacks with the same calmness as her Chinese co-workers and found that all apparent problems could be overcome one way or another. At harvest, fruit were weighed and assessed on marketability indices and a sample from each treatment was used for testing sugar content and fruit firmness. Two

post-harvest workshops were held in Xinjiang to introduce simple and cheap small-scale post-harvest technology to farmers, wholesalers and extension officers. Many of the farmers were enthusiastic about some of the simpler technology and recognised the potential to improve the quality and shelf life of their produce. On the downside, lack of stable land tenure, fragmentation of the supply chain and a lack of trust between industry stakeholders remain strong disincentives to any improvements in management practices, particularly where changes in infrastructure are needed. In their bid to improve supply-chain management, the researchers have conducted transport studies from Gansu to Beijing and from Xinjiang to Shanghai using conventional management practices.

Dr Sherrie Wei, Professor Li Xue Wen and Kim travelled to Shanghai to assess the fruit being transported from Urumqi by train. Much to the amusement of staff at the train depot, they individually evaluated each fruit and recorded the development of disease both photographically and on a computer. Poor conditions during transport, exacerbated by fruit over-maturity, led to rapid development of disease. These conditions cancel out the effect of the earlier treatments to control disease and show the importance of the integrated approach – any recommended disease control strategies must include adequate management practices, as well as the technologies for improving disease resistance.

The project team has completed consumer surveys in Shanghai, Wuhan and Beijing to see what consumers think of the improved quality of melons and whether they are prepared to pay more for them. A cost-benefit study will be carried out on the adoption of techniques such as spray treatments by farmers.

*Kim-Yen Phan-Thien is now working as a volunteer for Australian Volunteers International in Indonesia.*

DR STEPHEN MORRIS



# Extending the shelf-life of leafy vegetables

Post-harvest improvements are expanding the industry, reports Robin Taylor

**W**hen the world's sporting elite gather in Beijing in 2008, they will be crunching on vegetables sourced by the Beijing Vegetable Research Centre (BVRC).

The BVRC was one of the partners in an ACIAR project to examine post-harvest management of several key vegetables in China, resulting in improved handling, packaging and transit technology being adopted by the industry. These improvements to extend the shelf-life of vegetables were an important factor in the BVRC being awarded the Olympics contract.

In China, as in Australia, the factor most limiting expansion of the vegetable industry is the short shelf-life of products.

"Many leafy vegetables, such as pak choy and broccoli, tend to perish quickly after harvest," says the leader of the project, Dr Tim O'Hare of the Queensland Department of Primary Industries and Fisheries. "Commodities such as Chinese

cabbage and oriental bunching onions are storable but losses during storage can be further reduced."

The project team examined handling and storage methods in China for pak choy, oriental bunching onions, Chinese cabbage and broccoli. They measured losses for the four vegetables in China by sampling at different points in the handling chain and at different times of year.

Physiological factors that limit the post-harvest life of pak choy and Chinese cabbage were identified and used to develop options to extend shelf-life. Some of these options are simple and low-cost measures that, since their introduction, have reduced post-harvest losses. For example, the project team bought 1000 recyclable plastic crates to replace bags for transporting pak choy, which was being crushed.

"At first the farmers were unwilling to accept the crates, as they found bags easier to handle," says Dr O'Hare. "But after two or three months use they accepted the crates, resulting in improved

quality and increased prices."

Another improvement has been the introduction of segregation of cultivars and grading. Tomatoes, for example, were sorted into three grades – big, medium and small – to enable improved returns and more targeted marketing.

After observing the way cabbages were handled at harvest, the scientists were able to recommend that growers remove fewer leaves, resulting in less damage during transport and better returns to the grower.

Since the project, the BVRC has also been involved in the development of handling and cooling systems for suppliers of lettuce to fast-food chain McDonalds in Beijing. Such was the improvement in lettuce quality that McDonalds Shanghai has begun sourcing lettuce from Beijing.

Many of the findings from this project are reported in 'Postharvest handling of fresh vegetables', ACIAR Proceedings 105.



Buying pak choy at an open-air market: replacing bags with crates has improved the quality.