



VITAL CROPS LIFTED BY SCIENCE PARTNERS

Brad Collis reports on the benefits flowing from ACIAR's support of crop research at ICARDA in Syria

A similar climate and shared plant breeding goals is fostering an increasingly important relationship between Australian crop researchers and colleagues at the International Center for Agricultural Research in the Dry Areas (ICARDA) in Syria.

Of particular relevance is the work in pulses, because of the importance of crops like chickpea, lentils and faba beans in providing high-quality, low-cost protein in many of the world's poorer communities.

These legumes are among the most important crops grown in

sub-tropical dry areas in Asia, Africa and Australia, offering farmers a source of dietary protein and also income. Nitrogen-fixing legumes also provide an alternative to costly fertilisers.

However, production constraints – pests, diseases and impoverished soils – continue to deny farmers the crops' full potential.

The ACIAR-supported ICARDA research that links researchers in Syria and Australia is vital because it marries the vast source of germplasm available in the Mediterranean and Central Asia region with advanced research capabilities in Australia, where the same crops are becoming increasingly important to graingrowers who need more break crops for their cereal rotations.

This has led to an ongoing exchange of varieties that are 'improved' in Australia, in terms of yield and other agronomic advances, then returned to ICARDA to be screened for pests and diseases.

In the chickpea program, which has already resulted in several recently-released varieties in Australia with resistance to *Ascochyta* blight, ICARDA is working with the Department of Primary Industries (DPI) in Victoria and the Centre for Legumes in Mediterranean Agriculture (CLIMA) in Perth to screen chickpea breeding material for the disease *Fusarium* wilt.

The disease has not yet been found in Australia, but the collaboration means researchers will be ready with resistant varieties the moment the disease appears.

The senior legume pathologist with ICARDA's germplasm program, Dr Bassam Bayaa, explains that suitable germplasm and/or breeding material is first identified at ICARDA and then sent to

Legume pathologist Dr Bassam Bayaa (left) with chickpea breeder Dr Rajendra Malhotra, in a plot at ICARDA where plants are exposed to pathogens to screen for resistance.



BRAD COLLIS

PARTNER COUNTRIES: Armenia, Azerbaijan, Georgia, Global, Kazakhstan, Kyrgyzstan, Syria, Tajikistan, Turkmenistan, Uzbekistan

PROJECT: Plant genetic resource conservation, documentation and utilisation in Central Asia and the Caucasus (CIM/2004/004)

DESCRIPTION: Regional diversity, farming systems and evolutionary processes have led to exceptional plant genetic diversity.

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on the other side, the pathogens are trying to keep ahead for their own survival.”

The challenge for plant pathologists and breeders is to try to introduce resistance genes from plants that also have desirable agronomic traits. But new sources of resistance are often found in plants that are poor agronomically: “Without biotechnology, it becomes a very long process to exploit a good source of disease resistance from an otherwise poor plant,” says Dr Bayaa.

Related ACIAR-supported research at ICARDA includes the study of the epidemiology of major fungal diseases such as the *Ascochyta* pathogen, under Dr Amor Yahyaoui; plant genetic resource conservation, under Dr Ken Street; and a new crop improvement program in Iraq, under former ACIAR research program manager Dr Colin Piggin.

Dr Piggin recently moved to ICARDA to head up a new overarching program, ‘Diversification and Sustainable Improvement of Crop and Livestock Production Systems in Dry Areas.’

This is a holistic program looking at ways to introduce into traditional farming systems modern principles such as conservation cultivation (stubble retention), new crop rotations such as canola and brassicas, and agroforestry opportunities.

“For example, there is a great lack of trees in dryland environments and clearly they can be a useful landscape resource ... but how do you establish such long-term ventures in poor areas ... how do you discourage plantations from being cleared the moment the trees are large enough?”

To address challenges and opportunities like these, the diversification and sustainable improvement program is divided into three groups – small animals, agronomy and crop protection.

Dr Piggin says that even the smallest application of science to traditional farming systems can have long-term impacts. He tells the story of some Syrian farmers whose efforts to diversify from traditional wool and hide products into milk products kept running into quality issues at market.

The milk business was new to them, but vital for their economic wellbeing, because the market for their traditional products had fallen away following a diminishing demand from the Russian army.

ICARDA researchers looked into the issue and solved the first issue – milk spoiling – by simply having the farmers carry the milk in sealed or covered containers.

The second issue – yoghurt being turned into cheese by the rough roads – needed a little more science. The researchers had to experiment with a few different bacterial cultures that produced a firmer yoghurt, less susceptible to the effects of shaking.

In both situations the changes required by the farmers were small, but the benefits were significant. ◀



Dr Colin Piggin in Syria: he sees increased diversification as the key to helping traditional farmers increase their agricultural capacity.

researchers at the Victorian DPI, NSW DPI, the University of Adelaide and CLIMA.

“These genetic resources are used in Australian breeding programs and the most promising lines are sent back to ICARDA for further screening for resistance to major diseases.

“Several hybrid faba beans (five lines and three crosses) sent to us from the program in the University of Adelaide were the best performers in our nurseries at ICARDA in 2005.”

ICARDA researchers are constantly on the lookout for new sources of disease resistance and seed-collecting missions are routinely undertaken in areas where there might be landrace varieties or ancestral plants with broad genetic bases.

An ACIAR-supported mission to China last year yielded 25 new faba bean lines for introducing to the genetic pool.

“Crop protection is a never-ending struggle,” Dr Bayaa says. “On one side, you have breeders trying to find and develop resistance and



Tragic setback for Iraq project

A senior Iraqi agricultural adviser, Dr Awad Abbas, who was working on a new ACIAR-ICARDA project in Iraq, was assassinated on his return home to Baghdad after a project meeting at ICARDA in Aleppo, Syria. Dr Abbas was murdered on Saturday 10 September, allegedly by forces trying to unseat the new Iraqi Government.

Dr Abbas was the Director General of Extension and Cooperation in the Ministry of Agriculture. He had been visiting ICARDA during July and September to help plan the new Iraq-ICARDA-ACIAR dryland cropping project.

The project – ‘Better crop germplasm and management for improved production of wheat, barley and pulse and forage legumes in Iraq’ – is being funded by ACIAR and AusAID as part of Australia’s contribution to the rehabilitation of agriculture in Iraq.