

# North Asia

Financial year	Regional expenditure	Percentage of total project expenditure	Commission target as percentage of expenditure
2007-08	2,407,226	5.6%	<15%
2006-07	3,113,070	7.9%	<15%
2005-06	4,285,364	12.2%	<15%

ACIAR’s program in North Asia concentrates on China. For the region an expenditure target of not more than 15 per cent of our overall annual research expenditure has been set.

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# China

AOP budgeted expenditure in 2007–08	\$2,708,893
Actual expenditure in 2007–08	\$2,407,226
Expenditure in 2006–07	\$3,113,070
Expenditure in 2005–06	\$4,161,160

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China



Expenditure includes both bilateral and multilateral projects

Key performance indicators	Performance 2007–08
Options for economically viable rangeland management practices in Gansu and Inner Mongolia that have positive impacts on rangeland ecology and greenhouse gas emission identified and communicated to stakeholders	Analysis of livestock production systems in Gansu and Inner Mongolia identified several areas where improvements in household incomes could be achieved while also reducing the pressure on grasslands and methane outputs. These are: culling less productive animals, selling marketable animals by early autumn, only grazing grasslands over summer and pen-feeding livestock through autumn, winter and spring. Workshops to model and discuss this new approach have been held with partners and local officials in each province, and Department of Agriculture, Fisheries and Forestry project is modifying demonstration farms, arranging field days and developing training materials in Inner Mongolia.
ACIAR's program in Tibet Autonomous Region is refined by building on initial progress with crop-forage-livestock	A new project 'Integrated crop and dairy systems in Tibet Autonomous Region, PR China' designed and implemented to build on earlier ACIAR and other donor work in this area.
Useful genetic diversity for agronomically useful characteristics such as frost tolerance and disease resistance identified in Chinese pea or faba bean germplasm	In peas, tolerance to salinity and frost, high yielding ability under low rainfall and new sources of resistance to Bean Leaf Roll Virus (BLRV) and Seed-borne Mosaic Virus were identified. Faba bean germplasm from China provided source of resistances to Aschochyta blight and to BLRV and frost tolerance.
Evidence of utilisation of the results of economic, trade and policy-related research by Chinese Government policy makers	Financial and socio-economic assessment of the key 'Grain for Green' Program undertaken to examine incentives for farmers together with recommendations on the policies best able to deliver sustainable agricultural systems. Results of work on 'achieving food security in China: Implications of WTO accession' published in June 2008. Key policy collaborators examined trade and policy options to improve food security and determine the costs of alternative strategies.

Key performance indicators	Performance 2007–08
At least 40 per cent of all new projects designed to have components leading to significant farmer or policy impacts within five years of completion	Two of the four new China projects ('Improving the efficiency of land use change policy' and 'Integrated crop and dairy systems in Tibet Autonomous Region') designed to have significant impacts within five years of completion.

## Position

Over the last decade the focus of ACIAR's program has shifted towards a stronger, but not exclusive, focus on western China. This concentration on a geographic zone has been further limited largely to north-western China to focus limited funds and to address the major challenges of low farm incomes and significant land degradation in that part of the country. In this context an emphasis on soil and water management has emerged with agreement from Chinese partners as an important component of current and future research partnerships. This emphasis is combined with policy-research interventions designed to analyse and develop policy options to enable the application of well-designed environmental policy frameworks and associated rural adjustment, domestic regulation reform and trade liberalisation activities.

In view of China's current status as an emerging economy and its well-resourced National Agricultural Research System, ACIAR is increasingly requiring a shared-cost arrangement for collaborative projects. This mutual funding also extends to Australian research partners in cases where Australian benefits are also apparent. This current approach is in line with Australia's wider cooperation and aid programs in China. Australia's engagement with China has largely shifted away from discrete poverty-reduction activities towards the sharing of research and wider endeavours, high-level capacity building and policy-development partnerships.

## Achievements

### Subprogram 1: Increased water productivity of agriculture in north-western China

Pollution caused by dust remains a significant problem in north-east China. The problem arises from dust storms that come from the north-west pushed by prevailing westerly winds. Responding to this, the Chinese Government has implemented the Grain for Green Program (GFGP) offering farmers incentives to establish trees and perennial pastures. A project undertook some elements of a **cost-benefit analysis of the GFGP Program**. It addressed the priority issue of quantifying its ecological impacts, identified key areas for further research, and helped improve decision-making in the GFGP policy context. The researchers developed a model to simulate the natural hydrological processes in the Yellow River Basin from 1956 to 2000 and from this they determined that the GFGP had a relatively small potential impact on flood reductions in the Yellow River Basin. The researchers calculated an economic benefit from flood reductions of RMB362 million, a small amount compared with the total investment of around RMB65.5 billion in the region under the GFGP. Based on these findings, the potential economic benefits from flood reductions (due to reduced runoff under the Program) will be offset by the potential economic losses from lower agricultural production (RMB667 million) with reduced run-off under the program. A new project has commenced to examine alternative policy options to improve the cost-effectiveness of the various land use change programs that the Chinese Government currently finances.

In China and Australia, **large-scale revegetation using perennial plants** (grasses, shrubs and trees) is currently under way, and more is planned. The principal reason for revegetating the hilly parts of the Loess Plateau region of western China is to reduce soil erosion and thus improve water quality of the Yellow River. However, in both countries the impacts of large-scale revegetation on broad-scale hydrology are poorly understood. A project has developed a bilingual computer based simulation tool called ReVegIH (Re-Vegetation Impacts on Hydrology) that supplies terrestrial land-use managers (both forestry and agriculture) with suitability assessments of 38 perennial tree and shrub species, and identifies priority and target areas where revegetation activities should occur. It also enables them to assess the changes in water use that will result from revegetation activities.

In Sichuan province, extreme site degradation and the harsh, dry climate on much of the upper Yangtze catchment has made it difficult to re-establish the natural forest and native species after site degradation. Therefore Chinese forest scientists have tested a range of **exotic tree species for their suitability as protection forests**. *Pinus radiata*, a conifer widely used in Australia in commercial plantations, holds promise, and a project has deployed Australian experts to work alongside Chinese scientists to test and introduce a better range of *P. radiata* germplasm to the catchment. They assessed the biological risks of establishing the species in such a new environment, and developed nursery, field and data management technologies to support the large expansion of plantings. A major task was to integrate information on site and climate in south-west China in general and in the dry river valley area in particular with knowledge on growth performance of *P. radiata* elsewhere in the world. This combination is enabling the team to identify suitable areas for environmental plantings of *P. radiata*.

Efforts have gone towards **increasing the productivity of cool season pulses** in rainfed agricultural systems of China and Australia. China provided Australia with a geographic pea core collection of 298 accessions, plus new collections of 95 faba bean and 93 pea landraces. In both China and Australia the imported germplasm continues to be assessed and used in the respective breeding programs. In peas, tolerance to salinity and frost, high yielding ability under low rainfall and new sources of resistance to Bean Leaf Roll Virus (BLRV) and Seed-borne Mosaic Virus were identified. Faba bean germplasm from China provided a source of resistances to Aschochyta blight and to BLRV and frost tolerance.

**Permanent raised beds** (PRBs) have been promoted through ACIAR research to minimise the effects of waterlogging, reduce irrigation water and improve the biological and physical health of the soils—all to increase productivity of crops. But design criteria for PRBs, in terms of infiltration and drainage, are not well developed and have frequently come about in relation to machinery specifications. Other concerns are correct fertiliser placement for nutrient and solute management, and minimisation of salt build-up. A project in China, India, Pakistan and Indonesia sought to underpin existing ACIAR project work and develop criteria for optimum bed design. Scientists determined that the main advantages of PRBs were good utilisation of water and fertilisers when bed configuration is correct, and much better aeration for all soils (especially clays) following irrigation. The main disadvantages for permanent raised beds were salt build-up in the centre of beds and leaching of nutrients and agro-chemicals to the groundwater. Other issues needing further scrutiny were bed width and uniform wetting of soil throughout the bed.

ACIAR has invested in **conservation agriculture** in the water-stressed Hexi Corridor in Gansu, using permanent raised beds in irrigated cropping. Key constraints are the



*Increasing water productivity is vital to dry land farming systems of Gansu and Shanxi provinces*

lack of appropriate machinery and competition for crop residues. A second generation powered disc no-till planter and a tractor-mounted wheat harvester are among the machinery being tested. Comparative performance of irrigated spring wheat in permanent raised beds, fresh raised beds, zero till-control traffic and conventional tillage was assessed. Crop emergence, yield and applied irrigation water at three demonstration sites followed similar patterns to those found at the Research Station. This indicates that conservation agriculture can be implemented in this region without loss of yield, and with considerable gains in natural resource conservation, provided that the operational capabilities of the prototype machinery continue to improve.

An **evaluation of opportunities and constraints for R&D investment into increasing water productivity** and agriculture in north-west China has been completed. The project has scoped the development, promotion and adoption of practical and low-cost technologies of rain water harvesting and in-field soil water conservation for the dryland farming systems of Gansu and Shanxi provinces. The project has identified a range of technical, institutional and coordination issues which warrant attention for the future and will be jointly considered with Chinese partners.

### **Subprogram 2: Improved agricultural productivity in Tibet Autonomous Region**

In efforts to improve **dairying in Tibet**, scientists conducted a study on 36 smallholder family farms in four regions – Lhasa, Shigatse, Bailang and Naidong. The project established benchmark data on diet composition, milk production, reproduction parameters, and rates of survival and growth – all previously unknown to the Tibetan dairy industry. The scientists found that current feeding systems relying heavily on cereal straw did not allow full expression of genetic potential in the animals, and this constrained farm and industry production. Further work investigated sources of high quality green feed which are necessary to formulate annual feed budgets, and also evaluated suitable protein supplements.



*Dairy cattle in Tibet*

### Subprogram 3: Implications of Chinese trade developments for smallholders

Concern has grown in China that technical regulations such as **sanitary and phytosanitary standards** are increasingly being used to discriminate against some of its exports. This is especially in the European Union, Japan and the United States where China has the highest stakes but also encounters the most barriers. Moreover, because of the difficulty of legally challenging these standards, it is often considered more practical to meet these foreign standards. Although China has enacted many laws and regulations on food and agricultural production, many problems still exist in its food safety regulatory system, and a project involving the International Food Policy Research Institute has undertaken an economic analysis of technical barriers limiting agricultural trade of China. It is also helping to build capacity in both the public and the private sectors to help China move toward better food safety status and create more trade opportunities.

A project to **improve postharvest practices within the vegetable industry** in the Beijing district has been extended to maximise the uptake of results by lifting food safety and reducing spoilage risks. Activities focus on evaluating the vegetable supply chain from a food safety and product quality perspective



*Women selling melons: postharvest melon disease research aims to reduce reliance on fungicides*

and identifying the needs and priorities for process improvement. The project team is using these evaluations as the basis for drawing up guidelines for production of safe, high quality vegetables. The team is also receiving help from tertiary students to investigate the potential for ultrasonic washing of pak choi, carrot, spinach and tomato which could reduce spoilage and lower the risks of contamination.

In both China and Australia, fruit rots caused by *Rhizopus*, *Alternaria*, *Geotrichum* and *Fusarium* fungi are the **major diseases causing postharvest losses in melons**.

New options are needed to reduce reliance on fungicides and maintain quality during transport and marketing. A project has studied how to protect melons from postharvest disease, either by boosting natural defence mechanisms or by better treatments to maintain quality during transport to distant retail markets in China and Australia. In one trial of melon fruit a postharvest dip for one minute in 30 parts per million iodine solution at 55°C provided excellent postharvest disease control, equivalent to that achieved by conventional fungicides.

ACIAR has published the results of a recent study by researchers in the Crawford School of Economics at the Australian National University and the China Centre for Economic Research at Peking University. This report summarises the results of an analysis of the World Trade Organisation (WTO) accession for China's agricultural sector. Major findings of the project are that there should be a clear welfare gain from WTO trade liberalisation for the Chinese economy as a whole. However, there will be some sectors in agriculture and in other parts of the economy that will be losers (including land-intensive agricultural industries such as grains). Labour-intensive agricultural activities such as horticultural production and agricultural processing will gain most. The study entitled **Achieving food security in China: implications of WTO accession** provides important information to help address key policy reform decisions



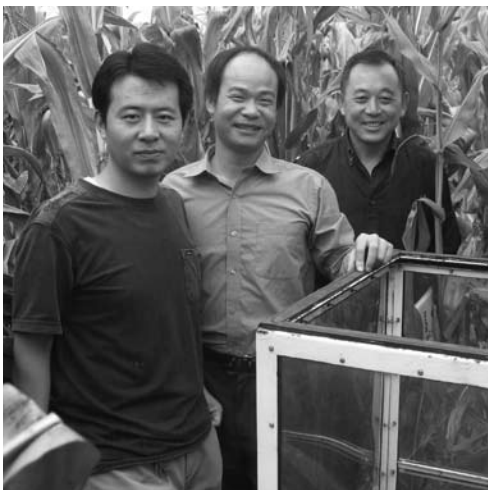
*Postharvest improvements are expanding the quality and shelf life of fresh market vegetables*

in China, including the economic costs of food self-sufficiency policies.

#### **Subprogram 4: China linkages scheme**

During the year an Australian industry and research group visited China and met with collaborators in a range of important

cold regions which have rice varieties with significant **cold tolerance characteristics**. These have been grown for many years in these regions. A total of 740 of these varieties have been screened for high levels of cold tolerance and the four most promising have been used in Australian breeding activities to transfer the genes to Australian varieties. The project has been extended for an additional year to allow for a final visit by the Chinese collaborators to see some of the Australian research outcomes during the Australian rice growing season and finalise transfer of molecular technologies. This year the lack of an Australian rice crop inhibited this visit.



*New technologies for improved water and fertiliser use in maize crops are being trialled in the Shanxi Province, China*