

North Asia

Financial year	Regional expenditure	Percentage of total bilateral expenditure	Board target as percentage of expenditure
2003-04	\$4,616,136	18.1	10-20%
2002-03	\$4,158,518	15.7	10-20%
2001-02	\$3,838,370	15.7	10-20%

Expenditure for North Asia has remained within the range defined by the Board. A small program has been under way in the Democratic People's Republic of Korea (DPRK) for two years, with an emphasis on developing long-term food security through more sustainable agriculture. The focus of activities in China has shifted to the less-developed western regions of that country.

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ACIAR regional team leader for North Asia: Mr Michael Brown.





Winter wheat storage

China

Active projects in 2003–04	35
AOP budgeted expenditure in 2003–04	\$3,616,448
Actual bilateral country expenditure in 2003–04	\$4,231,678
Bilateral country expenditure in 2002–03	\$3,951,287
Bilateral country expenditure in 2001–02	\$3,723,944

Key performance indicators	Performance 2003–04
<ul style="list-style-type: none"> Increased co-investment by Chinese Government in ACIAR projects. 	Major co-investment in grain drying facilities, extension of forage management in red soil areas, wheat improvement, wool quality, sugarcane breeding, tropical legume production.
<ul style="list-style-type: none"> Initiation of two projects in Tibet Autonomous Region. 	Two projects commenced, one initiated and in development and a research contract initiated.
<ul style="list-style-type: none"> Agricultural sustainability a theme of at least two-thirds of projects. 	Seventy-five per cent of projects started in 2003–04 address agricultural sustainability issues.
<ul style="list-style-type: none"> Evidence of cross-disciplinary approaches to projects on improved water resource management. 	One policy and two biophysical projects developed emphasising water resource allocation and management in the Yellow River Basin.
<ul style="list-style-type: none"> Identification of a suitable summer crop for use in cereal-based rotations in Gansu province. 	Field peas and soybeans identified for areas of Gansu as a viable option in wheat-based rotations with similar wheat yield levels.
<ul style="list-style-type: none"> Evidence of significant uptake of conservation tillage in China based on initial ACIAR project work. 	Sixty conservation cropping demonstration areas now cover more than 100,000 ha in 13 northwest provinces.

Position

The focus of ACIAR's program is shifting towards western China in line with the poverty-reduction emphasis of the Australian aid program and China's own priorities. ACIAR has begun to implement projects in Tibet Autonomous Region and continues to target the needier northwest and southwest regions. There is also an increasing emphasis on sustainability aspects of agricultural production. In view of the significant human and financial resources available within the Chinese national agricultural research system, and the strong mutual benefits to Australia, ACIAR projects in China usually have significant sharing of costs between Chinese and Australian research providers. Collaborative research on aspects of agricultural development policy continues, as does work on water, soil and forest resource management.

Achievements

Two new projects have begun in Tibet Autonomous Region (TAR). The first is examining current rodent control techniques, to deliver management practices that target certain species only. This will reduce the incidence of non-target species being affected and create more **sustainable management approaches**. The second project aims to intensify production of grain and fodder in farming systems in central TAR, through better matching of varieties to local conditions and the introduction of improved agronomic practices.



Chris Brittenden manages our North Asia Program

The **implications on food security of China's accession to the WTO** are being assessed through development of a general equilibrium model. More than 40 industry sectors, including five from agriculture, are incorporated. This has revealed that income disparities between regions are likely to be exacerbated as a result of accession. Food security overall is unlikely to be affected, but some regional households may suffer. Policy options to distribute benefits more evenly and ensure household food security are now being examined. A related project is examining policy options for public investment in western China. Such investment is already known to be an important element in reducing poverty.

Two projects are supporting research into policies relating to water. The first supports **management of water allocations in the Yellow River Basin**, using simulations to evaluate current and potential allocations. The second project is analysing the Chinese Government's Grain for Green Program (converting cropland to forests and agroforestry) to support related policy initiatives.

Beef production from pastures in the 'red soils' region of China depends on finding grass and forages suitable for cattle and is also helpful in erosion control. Options have been **developed for year-round feeds**, utilising cut-and-carry forages in combination with other on-farm resources, such as rice straw and rice bran, and off-farm resources like molasses and cottonseed meal. Agronomy trials have identified the optimum harvesting schedules and fertiliser rates to produce high-quality feed in summer and winter, matched by feeding trials with cattle to determine the best combination of feeds throughout the year. A model to formulate rations, based on available feeds and estimated growth rates, has been developed. Several hundred extension workers, and several thousand farmers, have been provided with training in forage production and cattle feeding. On-farm testing of forage and cattle production has begun. A computer-based model has been developed to demonstrate the impact of interventions such as **increasing the area of forages** on farm income, labour requirements, cash flow and profitability.

Trials of a management model for working woollen mills have begun, following translation of the model into Chinese. This has been well received, and refinements based on feedback from mill workers are now being incorporated. A fuller picture of garment-making and fabric-trading in China has been drawn, including supply chains. This is being used in interactions with local officials to recommend improvements to the system. Methods to **recover potential pollutants** have been furthered in a project to reduce the impact of wool-scouring effluent in China and India. This has been based in part on new technology, with costs offset by increased profitability, both from the implementation of technology and modifications to existing practices. Less water is now used and the chemical sludge from scours is now recognised as an effective manuring compound when mixed with green material.



Experimental eucalypt plantation



Forage trials



Spring wheat



Genotype by environment (GxE) studies conducted over three years and associated sterility studies have been completed as part of research to improve wheat in Sichuan Province. The results will provide a useful guide to the design of breeding strategies to **ensure good performance for local conditions**. Quality wheat populations have been selected and are being tested for taste. The problem of wheat sprouting while in the field has been addressed; sprouting resistance mechanisms have been clarified and scientists have identified germplasm resistant to this and other defects such as black tip. A workshop on GxE studies was held to train Chinese wheat breeders in analysis of these trials.

Support for China's grains storage is being provided through establishment and verification of a **national standard for modern grain storages**. Field trials, to extend this to older storage facilities and to grains stored under plastic sheeting, are now under way. Training of provincial grain authorities in the new standards and in improved fumigation practices has also taken place. A carbon dioxide application methodology to control pests in storage has been optimised, with levels for a range of pests defined. Temperature and humidity levels and their roles in increasing the toxicity to pests of phosphine, the main fumigant used, have also been characterised.

The oilseeds rapeseed and canola produce oils used in food preparation and products. The local Chinese and Indian rapeseed varieties do not produce oil of the same quality as canola (grown in Australia). A germplasm exchange program involving all three countries has just commenced to **help raise the quality** of Chinese and Indian varieties while also boosting the disease and pest resistance of canola. A separate project is also exchanging germplasm of the food legumes faba bean and field pea, to accelerate the incorporation of disease resistance into breeding programs. Exchange of sugarcane germplasm is enabling assessment of new sources of genetic diversity for incorporation into breeding programs for commercial lines.

Brassica vegetables are important as a source of food, accounting for almost half of total vegetable production and consumption. Pests are a major source of production losses, but **can be controlled through integrated pest management** (IPM) practices, developed during past research. An interactive information package using a range of media applications is compiling this research into 'best practice' examples for brassica integrated crop management. Research to tackle the ongoing management of crop production cycles is also under way.

Quarantine decision-support materials and training aids have been developed to support Chinese quarantine officers involved in domestic and international quarantine. A CD-ROM and website in Mandarin has been developed to provide information on laws and **regulations for plant quarantine**, basic knowledge on quarantine pests, viruses and diseases, and treatment methods for these pests. Interactive diagnostic keys for pest identification of 31 orders of insects are also available, as well as species fact sheets.

Postharvest disease losses are limiting the potential of the melon industry in western China. Trials have shown that appropriate preharvest treatment applications can control postharvest disease outbreaks. Additional postharvest treatment with fungicides has further helped to control postharvest spoilage. Testing of transported melons treated postharvest with fungicide dips **revealed the efficacy of this treatment** in preserving melon quality, compared to non-treatment that resulted in 80 per cent losses.

Eucalypts are a valuable source of timber, but growth stresses reduce the value and potential use of their wood. Tests on methods to displace growth strains have established some management techniques and also ruled out the efficacy of others. Cold-tolerant eucalypts help ensure the **continued expansion of plantations** into cooler areas of China. Base populations of two eucalypt species have been established to support improvement programs. Nursery propagation programs based on these species have begun, and plantation areas for cold-tolerant eucalypts are beginning to expand in Hunan, Fujian and Guangxi. A Seed Orchard Management Manual, based in part on project findings, has been produced.

The implications of planting *Pinus radiata* plantations to help **rehabilitate areas of the Yangtze River catchment** are being determined. Climatic variables are being assessed to help identify improved germplasm. Provenance trials based on this information will then be established.

Salinity is a serious risk to agricultural productivity and water quality in the irrigated areas of the Songnen and Yinchuan Plains. A **GIS database** of hydrological and hydrogeological information has been established for these areas and the Ord River Irrigation Area of Australia. Conceptual models of aquifers, surface and groundwater interactions have been developed and are helping to improve water management and reduce salinity buildup. In Hubei, the Zhange Irrigation Scheme delivers water to farmers who are then charged by volume ordered. New arrangements for water delivery and the way farmers order their water are being developed and recommended to the irrigation system operators.

Erosion on western China's Loess Plateau region is an ongoing problem. The introduction of conservation tillage to the region has shown that maize, soy and wheat yields can be improved using the new method. Beneficial effects are also shown for soil and soil water, **with erosion also being reduced**. Integration of lucerne has proven the viability of crops that generate income through fodder production and reduce nitrogen fertiliser inputs in conservation tillage systems. A newly commenced project is examining the effects of revegetation on the Loess Plateau. A wide range of data, including climatic and GIS information, has already been gathered and is being incorporated into a framework to analyse hydrological interactions.



Pea germination



Above: River bank erosion on the Loess Plateau and below—regeneration of vegetation

A youth ambassador helping project scientists in China



Creating stronger collaborative ties between project partners is achieved in many ways, from visits by Australian scientists to on-the-ground assistance. Australian Youth Ambassadors for Development, funded by AusAID, spend between three and twelve months working in a developing country. ACIAR provides assignments for some of these Ambassadors, providing a valuable in-country presence that strengthens collaborative ties. Kim-Yen Phan-Thien is working in China as an Australian Youth Ambassador assigned to ACIAR's project on improving postharvest handling and disease control of melons.

For many smallholder farmers melons are a potential

source of valuable income, but significant postharvest losses are reducing this. Kim's role in the project focuses on designing, implementing and analysing experiments to characterise natural disease resistance in melons. "Limited finances and access to resources in the poorer western regions have a much larger influence on experimental practice than most Australian researchers would imagine. These differences can be difficult to bridge via long-distance communication, and the facilitation of better understanding between Chinese and Australian counterparts is where my role as an AYAD has been most valuable." Her experiences in China, beginning in Lanzhou, Gansu Province in central China, then moving to Urumqi in Xinjiang in the far west, reflect the geographic shift in ACIAR's program, with an increasing number of projects supporting agriculture in the poorer regions of western China.



Inspecting melons



Democratic People's Republic of Korea



Active projects in 2003–04	2
AOP budgeted expenditure in 2003–04	\$382,458
Actual bilateral country expenditure in 2003–04	\$382,458
Bilateral country expenditure in 2002–03	\$207,232
Bilateral country expenditure in 2001–02	\$114,426

Key performance indicators	Performance 2003–04
<ul style="list-style-type: none"> Assessment of legume autumn rotation crops completed for second season. 	The second season has confirmed the viability of an autumn-sown legume that generates subsequent cereal yields similar to those from fallowing and use of nitrogen fertiliser.
<ul style="list-style-type: none"> English skills developed to enable admission of two scientists for postgraduate training in Australia. 	Trainees selected but permission to travel deferred by DPRK Government for 12 months.

Position

ACIAR's small collaborative research program addresses the Democratic People's Republic of Korea's pressing problems of food insecurity, which has been severe since the mid-1990s. Staple crops are low in productivity, in major part due to low soil fertility. Most agriculture is conducted in isolation from recent advances in technology. ACIAR began in 2001 by training DPRK scientists in Australia, to ensure that their isolation from developments elsewhere in the world was no longer a barrier to research. Current projects focus on lifting productivity of agriculture as a means of improving food security.

Achievements

The introduction of some vetch (legume) species into rice–maize cropping systems has been proven to help restore depleted soil nitrogen. Planting hairy vetch has resulted in **yield increases of up to 0.8 tonnes** per hectare for rice and maize planted as following crops to vetch. The added benefit is a reduced need for scarce fertiliser. Twenty-five other legume genotypes have demonstrated that they can survive in local conditions, particularly the harsh winters. Conservation tillage sowing of maize has reduced soil erosion, a major problem, by up to 75 per cent.

ACIAR's second project in DPRK began during the year, to improve pest management in brassica crops and introduce the concept of integrated pest management (IPM). Natural **enemies of brassica crop pests are being identified** and their impact assessed to evaluate their potential as biological control agents for use in IPM strategies.



Maize project



DPRK farm