

There are about 135,000 farm businesses across Australia. Many opt to contribute directly to funding agricultural research through a levy on sales that is matched by the Australian Government.



THE FUNDS THAT MAKE A DIFFERENCE

Although primarily identified as an 'aid agency', ACIAR also plays a vital role on behalf of Australian agriculture as a provider of research funds and it is one of the few such providers in Australia with a truly international reach.

BY DR GIO BRAIDOTTI

A CIAR has a dual identity that allows it to occupy a unique position in Australia's innovation system. The centre is part of Australia's aid program but also functions as a provider of research funds that benefit Australian scientific capacity and agriculture.

As such, ACIAR increases the overall research base dealing with agricultural issues of interest to Australia.

This aspect of ACIAR's character was noted by the Centre for International Economics (CIE) in its submission to the Productivity

Commission Study on Public Support for Science and Innovation:

In particular, ACIAR's emphasis on agricultural research to achieve sustainable development and natural resource management funds research that directly contributes to Australia's pursuit of better outcomes in areas such as water management, soil degradation, biodiversity and climate change responses. Similarly, ACIAR's projects dealing with food safety, animal and crop health and biosecurity concur with and contribute to Australia's need to maintain and enhance its agricultural and food health and safety status.

Independent economic assessment of impacts associated with ACIAR projects provides consistent evidence for large returns on investment to Australian agriculture.

In 2006, it was estimated that 65 ACIAR projects analysed delivered to Australian

agriculture \$768 million worth of benefits from an expenditure of \$134 million.

By 2012, a similar analysis of 120 ACIAR projects estimated benefits of \$2.2 billion had accrued to Australian agriculture from an expenditure of \$379 million.

These benefits are realised through many pathways. There are direct productivity improvements achieved because of new production technologies, or new breeds, varieties, vaccines, trade links and industries. Benefits also accrue from:

- the management of and protection from disease and pest incursion
- increased demand in third-country markets from meeting food safety, quarantine and quality requirements
- environmental, biodiversity and sustainability improvements associated with management of natural resources
- increased trade.



PHOTO: PAUL JONES

and leadership in consortia attempting a step change in the photosynthesis efficiency of rice and wheat crops.

Situated this way, ACIAR has been leveraging agricultural R&D nationally and internationally into areas of importance for Australian and partner country agriculture since 1982.

The linkages and networks are especially vital to Australian production systems given

their reliance on exotic species such as wheat, barley, sheep and cattle, and the foreign genetic resources needed to ensure ongoing productivity gains.

Ultimately, that means ACIAR adds unique capacity to Australia's innovation system, providing essential support to Australian agricultural productivity, profitability, biosecurity, sustainability and resilience into the future. ■

THE DRIEST CONTINENT SEEKS TO DROUGHT-PROOF ITS FARMS

ACIAR ACTION Farming on the world's driest inhabited continent is no trivial feat. Drought is an inevitable reality across the Australian agricultural sector and it is an ever-present challenge to the scientists whose research supports these production systems. Already, Australian crop varieties are among the most water efficient, able to yield around the two-tonne-per-hectare mark even as rainfall drops below the demarcation line of a desert (200 millimetres). Even so, 'drought tolerance' is an immensely complex genetic trait and there are no easy fixes. So as droughts intensify, agricultural scientists must pursue new, more sophisticated ways to drought-proof Australian farms and do so at a time of diminishing growth in public funding of agricultural science. In this setting, ACIAR in the 2000s has been funding one of the world's best

cereal drought tolerance teams to pioneer an entirely new class of traits. Led by Dr Michelle Watt of CSIRO Plant Industry, impressive gains are proving possible by selecting for deeper, more vigorous root systems, especially at the time of flowering and seed setting. Dr Watt says that soils often possess a reservoir of moisture at this time both in Australian and Indian dryland farming systems, but it is out of reach of the roots of current varieties. "Any water taken up through the roots at this time is directly used for grain production and could have a big impact on yield," she says. "We have calculated that the uptake of an extra 10 millimetres can contribute to an extra half a tonne of grain per hectare."

PHOTO: PAUL JONES



In allocating its investments, ACIAR brings together the agricultural R&D priorities of partner countries with the needs, interests and capabilities of Australian researchers.

These interests are pursued by commissioning collaborative research between international, Australian and developing country organisations in areas where Australia has a special focus and research competence.

ACIAR also supports the International Agricultural Research Centres (IARCs), primarily those operating under the umbrella of the Consultative Group on International Agricultural Research (CGIAR), to undertake R&D of common interest to Australia and developing countries in our region.

These linkages build multilateral capacity that can exceed that of individual nations and provide opportunities to share the costs and risks of so-called 'blue-sky' projects. At present this includes Australian participation

A NATURAL AT PROMOTING CAREERS IN AGRICULTURE

ACIAR ACTION Worldwide there is concern about the declining numbers of students enrolling in agriculture courses and Australia is not immune from this worrying trend. There are about 4,000 Australian jobs a year for tertiary-trained graduates in agriculture but currently universities are producing about 700. Even as science enrolments increased by 30% between 2002–10, the numbers taking up agriculture actually declined (–0.5%). The National Farmers' Federation says the situation is disappointing and recruiting young people into the sector is one of the industry's biggest challenges. Calls have abounded to better promote agriculture careers. ACIAR offers a range of scholarships and fellowships within its capacity building program. In 2013, there were 93 active postgraduate fellowships for developing-country scientists associated with ACIAR projects to study in Australia, with 38 scientists completing studies at either masters or PhD level. As they acquire new skills, this ACIAR cohort of students makes invaluable

contributions to Australian agriculture. Case in point is Dr Sambasivam 'Sam' Periyannan from India. During his ACIAR-supported PhD at the University of Sydney and CSIRO, he was an integral part of the team that isolated a disease-resistance gene that stunned the world. The gene, *Sr33*, protects wheat crops from all stem rust disease races including Ug99, which is capable of devastating 90% of the world's wheat varieties. Since completing his PhD, Dr Periyannan is working at CSIRO as a postdoctoral researcher where he is now closing in on two other novel stem-rust-resistance genes as part of the Borlaug Global Rust Initiative.

PHOTO: BRAD COLLIS

