

# Bangladesh



**A\$1.8** million  
**Budgeted funding**



**9**  
**Bilateral and regional  
research projects**



**2**  
**Small projects and  
activities**

## **Agriculture plays a pivotal role in the Bangladesh economy and in the lives of the vast majority of the population.**

The agriculture sector accounts for more than half of employment in Bangladesh. Notwithstanding its transformation from a country of chronic food shortages to one of net food grain self-sufficiency, Bangladesh still faces very substantial food security challenges. While poverty is steadily declining, many people still live below the poverty line.

Recently, Bangladesh has made impressive progress in achieving national food security. Investments in agricultural research have played a pivotal role in driving productivity increases of major crops. The ongoing challenge is to improve productivity of low-lying areas and rainfed cropping systems and increase rural incomes. This goal is adversely affected by increasing seasonal climate variability, reduced freshwater river flows and seawater intrusion.

Climate change is the most pressing issue for Bangladesh, with varying levels of vulnerability and impacts across the country. Coastal areas are prone to salinity intrusion and tropical cyclones, the floodplains in the central areas are prone to floods, the north-western region is prone to drought, the north-eastern region is prone to flash floods and the hilly regions are prone to erosion and landslides.

Bangladesh is an active participant in the global effort to combat climate change and must develop adequate adaptive capacity to protect its people and economy. In view of the substantial long-term challenges presented by climate change, the government has developed a long-term Bangladesh Delta Plan 2100 that focuses on developing approaches to sustainable management of water, environment and land resources.

The Bangladesh Climate Change Strategy and Action Plan is the de facto policy document that provides strategic direction for work on climate-change related issues. Many elements of climate-change adaptation in the country are also being addressed through specific sectoral policies. Recent consultations highlighted that the consequences of climate change on rural livelihoods is the most pressing issue facing Bangladesh and is likely to drive thinking about future priorities for research collaboration with ACIAR.

Key priorities for Bangladesh (National Agriculture Policy 2018) that align with ACIAR objectives are:

- » diversification of crops, including production of high-value crops
- » development and promotion of stress-tolerant, disease-resistant and nutritious crop varieties
- » improvement of crop production systems for market-oriented agriculture
- » building national capacity in innovation
- » extension of technologies to increase overall productivity growth and reduce the difference between research farm and field-level yields.

We support regional approaches to assisting Bangladesh, including in the areas of natural resource management, improving trade connectivity and encouraging investments to empower women to participate in cross-regional trade opportunities.

## Country priorities

Bangladesh has been an ACIAR partner country since the mid-1990s. Over time, the ACIAR program has shifted towards a farming systems approach supporting broader food security aspects, improved production and diversification of the rice-based farming systems and adaptation to climate change. This approach includes research on short-duration varieties of pulses to fit the farming system, conservation agriculture-based technologies and related mechanisation, saline land management and adaptation to climate change. ACIAR-supported programs in Bangladesh have focused on the undulating lands of the north and north-west regions and the coastal region (which is the poorest and most vulnerable region in the country). Bangladesh's ability to maintain food security given its high vulnerability to the impacts of climate change underpins the priorities for our support.

Key agricultural production challenges are common to many countries of South Asia, and we play a role in strengthening regional research linkages between Bangladesh and other countries, particularly India (Bihar and West Bengal states) and Nepal (eastern Terai region).

Consultation with key research and development stakeholders in Bangladesh and Australia established the ACIAR-Bangladesh Collaboration Strategy 2021-2030 and confirmed the following priorities for research collaboration:

- » crop improvement, with a focus on wheat, maize and pulses
- » improved farming systems, with a focus on cropping systems and diversification
- » water management, with a focus on managing both quantity (scarcity, groundwater and waterlogging) and quality (salinity)
- » soil fertility and soil management
- » markets, diversification and agricultural value chains.

Research will focus on farming systems of north, north-west and coastal Bangladesh.

The Krishi Gobeshona Foundation is a strategic partner and co-investor with ACIAR in Bangladesh. The foundation is an agricultural research funding organisation that has made major investments in funding research and capacity building in ACIAR-supported projects. The partnership with the foundation for collaboration in agriculture research and development in Bangladesh was renewed in January 2021.



With a focus on grain-based agriculture, a project in China, Bangladesh, Indonesia and Pakistan endeavours to understand the nature and drivers of successful rural transformation in order to provide better evidence for policy advice. Photo: Conor Ashleigh. ACIAR project ADP/2017/024

## 2021–22 research program

- » **11 ACIAR-supported projects in Bangladesh**
- » **4 projects are specific to this country**
- » **7 projects are part of regional projects**

The research program addresses our high-level objectives, as outlined in the ACIAR 10-Year Strategy 2018–2027, as well as specific issues and opportunities identified by ACIAR and our partner organisations. The following sections briefly describe individual ACIAR-supported projects and anticipated outputs in Bangladesh. The projects are grouped according to research program. Each project description is referenced in a list at the end of this section, which provides the project title and code.

### Agribusiness

Success in rural transformation is measured not only by income growth in the rural population, but also by the degree of inclusiveness in the society. A project in China, Bangladesh, Indonesia and Pakistan, led by Dr Chunlai Chen of the Australian National University, endeavours to understand the nature and drivers of rural transformation in order to provide better policy advice to underpin the success of transformation. With a focus on grain-based agriculture, during 2021–22 the project will select study regions and collect data to understand the components of success and the different impacts of rural transformation on women and men.<sup>1</sup>

### Climate Change

There are many potential agricultural management changes that could help accelerate global responses to climate change, but the pace of climate response is slow. Co-benefits modelling could help accelerate climate response by allowing more efficient screening of many potential interventions at once, comparing them to identify the subset that is most promising. The Agricultural Model Intercomparison and Improvement Project is a global collaborative initiative that has developed such a co-benefits modelling approach. A small research activity, co-led by Dr Carolyn Mutter and Erik Mencos Contreras at Columbia University in New York, will collaborate with colleagues in Bangladesh to trial the modelling methods in rice production systems. The researchers will refine and validate the approach and identify climate responses that have the greatest potential for multiple benefits in a cropping system, which have local as well as global significance.<sup>2</sup>

### Crops

In South Asia, adoption and adaptation of many farming system innovations are variable and low outside project areas, particularly for conservation agriculture-based sustainable intensification. A project led by Dr Fay Rola-Rubzen of the University of Western Australia will complete its research on understanding the decision-making behaviour of farm households using a behavioural economics framework. During 2022, the project will report on its testing of interventions on agricultural extension, input provision and service delivery, which are designed to encourage the uptake by smallholder farmers of innovations developed by other ACIAR projects. The project will also strengthen organisational and institutional capacity to better target interventions in the Eastern Gangetic Plains.<sup>3</sup>

In the coastal regions of southern Bangladesh, agriculture centres on the annual cropping of rice in the monsoon season and other crops in the dry (rabi) season. While the system is profitable, it is limited by topography, soil salinity and irrigation availability. A 5-year project led by Professor William Erskine of the University of Western Australia aims to improve productivity and profitability of dry-season cropping on non-saline land, and introduce pulses and wheat with improved salinity tolerance for saline land. Final-year activities for the project include demonstrations of best practice for mungbean, cowpea, garden pea and wheat production, field validation of wheat lines for salinity tolerance, and piloting the deployment of mini-mills to process pulses grains.<sup>4</sup>

A new fungal disease, wheat blast, is now established in Bangladesh and is a serious risk to food security in South Asia. Recent outbreaks have been small but widespread. A large-scale epidemic is inevitable in conducive conditions, and this will have a large impact on wheat production. A new project has been established to support the operation of the wheat blast screening platform established under a previous ACIAR-supported project. The platform is operated in Jashore by Bangladesh researchers, with support from CIMMYT, and is being used by the global wheat research community. Dr Pawan Kumar Singh of CIMMYT leads the new project, which will identify new sources of resistance to wheat blast, map the resistance genes, facilitate the rapid breeding of elite varieties for Bangladesh farmers and document variety adoption by farmers.<sup>5</sup>

Hybrid wheat has the potential to produce more grain from the same or less land, significantly contributing to food security and land sustainability. However, technical difficulties of hybrid wheat development and the high cost of hybrid seed have constrained the commercial development of new varieties for many decades. Professor Richard Trethowan of the University of Sydney leads a new project that aims to extend the benefits of new hybrid wheat systems to researchers, wheat breeders, farmers and consumers in Pakistan, Bangladesh and Ethiopia. The university has developed a novel, cost-effective and practical system to rapidly produce large numbers of wheat hybrid combinations for testing in breeding programs, and to produce large amount of hybrid seeds for sale to farmers at an acceptable cost. The project will establish the performance of the hybrids, and determine effective technical processes and business models to produce the seed in collaboration with the national programs and local seed providers in each country.<sup>6</sup>

Mungbean is an ideal rotation crop for smallholder farmers. The International Mungbean Improvement Network, established through a project led by Dr Ramakrishnan Nair of the World Vegetable Center, helped realise the potential of mungbean to improve cropping system productivity and livelihoods by improving researchers' access to genetic material, and coordinating and providing technical support to variety development in Bangladesh, India, Myanmar and Australia. Phase 2 of the network continues variety development for another 5 years, and extends the network to Kenya and Indonesia, providing access to new genetic material characterised for important traits, and improving cropping options for smallholder farmers in eastern Africa and South-East Asia.<sup>7</sup>

## Water

Improved nutrient management to increase the profitability and sustainability of intensive and emerging cropping systems is the focus of a project in the coastal zone of Bangladesh, led by Professor Richard Bell of Murdoch University. The first phase of the project (2017 to 2021) established that the adoption of fertiliser recommendation tools can decrease production costs and increase income and yield for smallholder farmers. The project has been extended until the end of 2022 to scale out the use of tools developed by the project and advance practice change. The final phase of the project will test a collective action approach for nutrient management and expand the scope for monitoring and evaluation of the innovations.<sup>8</sup>

In the salt-affected coastal zones of the Ganges Delta, which lies in both Bangladesh and India, this project has clearly demonstrated that improved crop, water and salt management can lift agricultural productivity and rural welfare when projects engage with farmers to understand their needs and priorities. A second phase of this work, led by Dr Mohammed Mainuddin of CSIRO, will use predictive modelling techniques, field trials and targeted demonstration to identify and implement packages of technologies, such as new cropping systems and improved water management that are tailored to the characteristics of different parts of the Ganges Delta region. Key to the process will be identification of risks to adoption due to variable climate and variable environments. The outputs of this project will provide information to support implementation of the Bangladesh Delta Plan 2100.<sup>9</sup>



ACIAR supports a project to understand how adoption and adaptation of technologies such as salt-tolerant wheat and pulses can be increased beyond project areas. Photo: Conor Ashleigh. ACIAR project CIM/2014/076



A new project aims to understand how food systems can be transformed to improve farm livelihoods while reducing inequity, production risk and unsustainable resource use. Photo: Conor Ashleigh. ACIAR project WAC/2020/148

The Eastern Gangetic Plains straddles Bangladesh, India and Nepal. The region is home to 450 million people and has the world's highest concentration of rural poverty. People in this region have a high dependence on agriculture for food and livelihood security. A new project, starting in 2021, aims to understand the processes and practices of transforming food systems through diversification to improve farm livelihoods while reducing inequity, production risk and unsustainable resource use. Dr Tamara Jackson of the University of Adelaide leads this project that begins with understanding the existing context for diversification in the region, covering a range of different technologies, scaling interventions, and policies and programs. The project will consider these elements individually and demonstrate the interactions between them using case studies to highlight where and how diversification has occurred in the past. In subsequent phases, the project will identify priority opportunities with communities and determine their fit with projected climate change and water availability, and the impact of high-level policies.<sup>10</sup>

The Sustainable Development Investment Portfolio (SDIP) drew on Australian expertise and technologies to improve integrated management of water, energy and food production in the basins of the Indus, Ganges and Brahmaputra rivers. ACIAR supported 10 projects over 8 years within this program in Bangladesh, India and Nepal. A small project will prepare delegates to build on the outcomes of SDIP at international and regional dialogues in the second half of 2021. Led by Dr Avinash Kishore of the International Food Policy Research Institute, a core team of local partners will undertake participatory 'foresight for food' exercises in their respective domains and then communicate their aspirations and concerns to policymakers and other stakeholders in the regional food systems.<sup>11</sup>

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See page 197 for contact details.

## Current and proposed projects

1. Understanding the drivers of successful and inclusive rural regional transformation: sharing experiences and policy advice in Bangladesh, China, Indonesia and Pakistan (ADP/2017/024)
2. Mitigation and adaptation co-benefits modelling trial in Bangladesh (CLIM/2021/109)
3. Incorporating salt-tolerant wheat and pulses into smallholder farming systems in southern Bangladesh (CIM/2014/076)
4. Enhancing farm-household management decision-making for increased productivity in the Eastern Gangetic Plains [Bangladesh, India, Nepal] (CSE/2012/108)
5. Wheat blast resistant wheat [Bangladesh] (CROP/2020/165)
6. Accelerating genetic gain in wheat through hybrid breeding in Bangladesh, Ethiopia and Pakistan (CROP/2020/167)
7. International Mungbean Improvement Network 2 [Bangladesh, India, Indonesia, Kenya, Myanmar] (CROP/2019/144)
8. Nutrient management for diversified cropping in Bangladesh (LWR/2016/136)
9. Mitigating risk and scaling-out profitable cropping system intensification practices in the salt-affected coastal zones of the Ganges Delta [Bangladesh, India] (LWR/2019/073)
10. Transforming smallholder food systems in the Eastern Gangetic Plains [Bangladesh, India, Nepal] (WAC/2020/148)
11. Regional foresight for food systems in the Eastern Gangetic Plains [Bangladesh, India, Nepal] (WAC/2020/158)