

# India

 **A\$0.67** million  
Budgeted funding

 **4**  
Bilateral and regional  
research projects

 **2**  
Small projects and  
activities

With more than 1.3 billion people, India is the second most populous country in the world, after China, and accounts for 18% of the world's population. Two-thirds of India's population live in rural areas, with landholdings averaging 1.1 hectares. The rural population is highly vulnerable to the impacts of a declining natural resource base, biosecurity threats and climate change.

Worth US\$2.94 trillion, India is the world's fifth largest economy, overtaking the United Kingdom and France. India is emerging as a major agricultural exporter of several key commodities and is currently the largest exporter of rice globally and the second largest exporter of cotton. While the contribution of the agriculture sector to GDP is declining, agriculture remains a major source of employment and accounts for 42% of the total national workforce.

The COVID-19 pandemic and associated lockdowns affected all sectors of the Indian economy; however, agriculture emerged as the main driver of economic growth, recording positive growth of 3.4% (at constant prices) in 2020–21.

Agricultural production has been increasing by an average of 3.6% per year since 2011, due to improved access to inputs such as fertiliser and seed, irrigation and credit facilities. The sector has also diversified from cereal grains to pulses, fruit, vegetables and livestock products, largely driven by evolving demographics, urbanisation and changing consumer demand patterns. However, the sector is still challenged by inefficient market mechanisms, subsidy distortions, lack of storage infrastructure, inefficient use of natural resources and susceptibility to climate change and extreme weather events.

In response to the COVID-19 pandemic, the government announced the 'Atmanirbhar Bharat Abhiyan' (Self-Reliant India) program in 2020. The initiative included institutional credit facilities at concessional rates, creation of an Agriculture Infrastructure Development Fund for projects at farm-gate and aggregation points, and release of emergency funds to provide working capital to farmers through crop loans. The initiative continued into 2021 with increased allocation to the infrastructure fund.

The Government of India, in its various policies and schemes, focuses closely on the role of women in agriculture. It advocates mainstreaming of women's role in agriculture as part of all programs in the agricultural development agenda.

Although 30% of budgetary allocations under various schemes have been made for women farmers, fund utilisation under these schemes has declined. Moreover, due to the complex and varied nature of agriculture in India, there has been a trend of defeminisation in certain pockets of the country. Although policy articulation by the government on the rights of women farmers has shifted, there is still a huge knowledge gap and limited resources to implement gender-inclusive agricultural development strategies.

In June 2020, the leaders of both countries participated in the Australia-India Leaders' Virtual Summit, where they elevated the bilateral Strategic Partnership to a Comprehensive Strategic Partnership. One initiative agreed under the partnership is that India and Australia will boost collaboration on science, technology and research, initially focused on COVID-19 responses. As part of the response being coordinated by Australia's High Commission, in 2022-23 ACIAR is working to clarify the role we can play in supporting the ambition for increased research collaboration between India and Australia.

In April 2022, the Australia-India Economic Cooperation and Trade Agreement was signed. The agreement includes a provision that both countries will cooperate to promote agricultural trade as part of the agreement and will work toward concluding an enhanced agricultural Memorandum of Understanding (MoU). An update to An India Economic Strategy 2035, an ambitious plan to transform Australia's economic partnership with India out to 2035, was also launched in April 2022. The Strategy was an independent report submitted to the Australian Government in 2018.

## Country priorities

ACIAR has supported a program of collaborative research with India since 1983. Presently, the ACIAR research program with India is delivered entirely through a regional collaborative approach involving neighbouring countries with shared issues and opportunities. Substantial co-investment from India will increasingly become a desired characteristic of our partnership to maintain an ongoing program of collaboration in future.

The geographic focus on the eastern regions of India and its neighbours will remain the same, with a thematic focus on:

- » management of agricultural water, including rainfed areas in the Eastern Gangetic Plains and coastal zone
- » sustainable intensification and diversification of cropping systems with support of conservation agriculture/zero tillage
- » breeding of improved varieties of mungbean
- » assisted policy development for farmers' livelihoods and climate change.

Existing collaboration between ACIAR and organisations in India has the potential to evolve into a substantial co-invested partnership providing benefits for both countries. As a result of a recent partnership refresh between ACIAR and Indian Council of Agricultural Research, in 2022-23 we will explore, at India's request, the possibilities for enhanced collaboration in:

- » sustainable intensification with a nutrition framework
- » diversification into new dry-season crops
- » the role of biotechnology in crop development
- » new mechanisation opportunities including farm robotics
- » a next phase of mungbean breeding for high-yielding varieties
- » groundwater management (overexploitation and under-exploitation)
- » co-investment and trilateral collaboration.

## 2022-23 research program

- » **6 ACIAR-supported projects in India**
- » **1 project is specific to this country**
- » **5 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 India. 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.

### Crops

Mungbean is an ideal rotation crop for smallholder farmers throughout the Indian Ocean Rim region. 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 project extends the network to Kenya and Indonesia, expanding the source of germplasm to develop new mungbean varieties, as well as strengthening the capacity of more national mungbean breeding programs.<sup>1</sup>

The practice of intercropping (growing 2 crops concurrently in one field) was widespread in the northern cereal-growing belt of the Eastern Gangetic Plains until the early 2000s, when disease restricted the area of wheat production. The recent and widespread production of maize – a wider row crop compared to wheat – creates new possibilities for intercropping. While wide-row intercropping has been investigated in North Asia and South America, little research has been conducted in South Asia. Potential benefits include increased cropping system productivity, increased water, labour and energy-use efficiencies, improved nutrition and food security for rural households, economic empowerment for women, and over the longer term, increased soil health. Ms Alison Laing of CSIRO is leading a small research activity on wide-row intercropping to test initial ideas and prepare a research project to design effective wide-row intercropping and determine its agronomic, social and economic implications in the Eastern-Gangetic Plains.<sup>2</sup>

Previous ACIAR projects have identified crop management options to increase productivity in the Eastern Gangetic Plains. This project led by Professor Fay Rola-Rubzen is identifying behavioural components of household decision-making about the adoption of new practices to support sustainable intensification based on conservation agriculture. In its final year, the project will collect evidence of the outcome of behavioural science-inspired methods to inform and engage farming families.<sup>3</sup>

## Water

The Ganges Delta region, in Bangladesh and India, is characterised by poverty, food insecurity, environmental vulnerability and limited livelihood opportunities, and is highly vulnerable to inundation from rising sea levels. Since 2016, ACIAR has partnered with the Krishi Gobeshona Foundation of Bangladesh to lift agricultural productivity, and hence rural welfare, by increasing cropping intensification. A new phase of the partnership, starting in 2022, aims to strengthen farmer confidence in the technologies introduced previously and demonstrate practices that may mitigate or avoid risks due to untimely rainfall and drainage management. Dr Mohammed Mainuddin of CSIRO leads the project that will also provide information to support the implementation of development plans in the region.<sup>4</sup>

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. Dr Tamara Jackson of the University of Adelaide leads a project 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. By gaining an understanding of the existing context for diversification in the region, and associated 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>5</sup>

Australian experts are providing technical support to 5 large land and water management programs in the Indian states of Andhra Pradesh and Odisha. These programs draw on previous ACIAR-supported projects on climate risk management, participatory groundwater management and social learning for irrigation management and governance. Dr Uday Nidumolu of CSIRO Agriculture and Food leads the project, which will work with Indian counterparts to integrate the research, support out-scaling and then co-learn about out-scaling. COVID-19 outbreaks in South Asia mean that training will be delivered online and field activities have been postponed.<sup>6</sup>

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See page 186 for contact details.

## Current and proposed projects

1. International Mungbean Improvement Network 2 [Bangladesh, India, Indonesia, Kenya, Myanmar] (CROP/2019/144)
2. Intercropping for intensification and diversification in the Eastern Gangetic Plains [Bangladesh, India] (CROP/2021/155)
3. Enhancing farm-household management decision-making for increased productivity in the Eastern Gangetic Plains [Bangladesh, India, Nepal] (CSE/2012/108)
4. Cropping system intensification in the salt-affected coastal zones of Bangladesh and West Bengal, India (LWR/2014/073)
5. Transforming smallholder food systems in the Eastern Gangetic Plain [Bangladesh, India, Nepal] (WAC/2020/148)
6. Water management for smallholder farmers: Outscaling ACIAR research in Andhra Pradesh Drought Mitigation Program [India] (WAC/2018/164)